Vol. 4. No. 1

January, 1948

SPE NEWS

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SPE NEWS

Issued Monthly to all Members of the Society of Plastics Engineers

Vol. 4 No. 1 January, 1948

TRANSFER MOLD PRESSURES

By ED. BORRO
Durez Plastics and Chemicals, Inc.

There are many definite advantages of transfer molding over the conventional compression molding method. For example, (1) faster cure, (2) delicate inserts and small holes may be safely molded, (3) practically no fin removal after molding, (4) close dimensional accuracy may be maintained provided accurate transfer pressure is maintained, (5) less wear on the mold surface, (6) superior finish, and (7) in most instances, superior physical and electrical properties may be obtained.

The term "transfer molding" is used to identify the process of forcing or transferring thermosetting material from a "chamber" into a closed mold cavity under heat and pressure.

During the process of transfer the material goes through a chemical and physical change from a hard substance to a "plastic" or a semi-fluid stage. The time required for this transition depends on the following factors: (1) pressure psi on the material chamber, (2) the type of material, (3) method used in preheating the material, (4) quantity of material, and (5) the dimensions of sprues, runners, gates, and air vents.

In most cases, transfer molding is used for the purpose of obtaining a more economical molding cycle. Hence, every advantage must be considered in the initial engineering stages of the mold and equipment, mainly the selection of pressure. For example, if we are compression molding a certain piece and obtaining a 10 seconds' close and a 60 seconds' cure, we certainly would expect to reduce this total time by the transfer molding method. However, this will not be accomplished if too low a pressure is provided, for the transfer time might be extended to a point where the total transferring and curing time will exceed the 70 seconds' cycle obtained by the compression molding method.

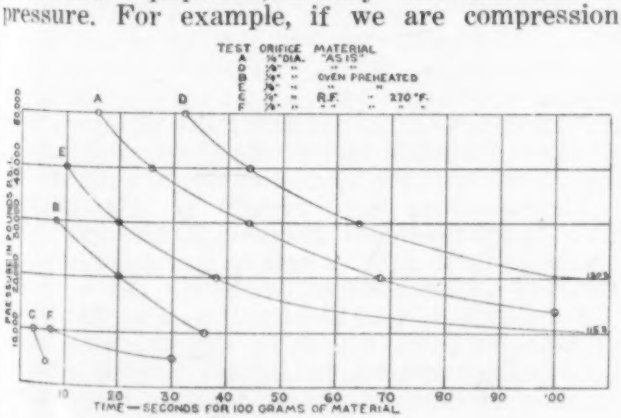

Fig. 1

Lower pressures will often result in an inferior product, slower cure, higher percentage of rejects, greater material loss due to larger sprues, runners, and thicker cull, and, in many instances, necessitate the use of extra-soft premium materials.

According to previous experience and numerous tests, the use of approximately correct or slightly higher pressures will result in the following advantages: (1) faster cure because of the intensified temperature obtained by the higher velocity through smaller sprues, runners, and gates, (2) stronger parts due to greater density, (3) superior appearance and (4) more economical cycle.

In some instances if the pressure is too high and inadequate escapement for the surplus material has been provided, difficulties with growth

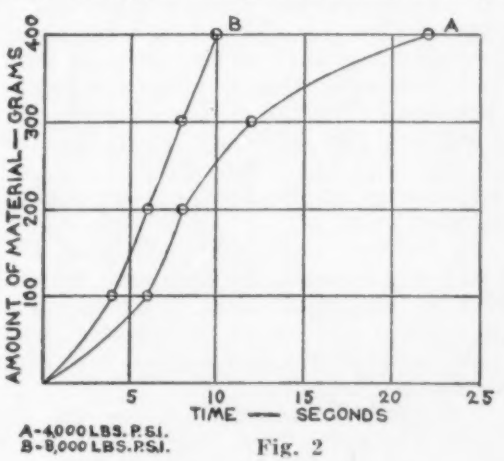

Fig. 2

(Continued on Page 31)

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DETROIT VOTES RESOLUTION OF THANKS TO PRESIDENT AND CONFERENCE COMMITTEES

Our National President, Thomas E. Orr presented a letter dated November 20, 1947, mailed as an enclosure with the November issue of S.P.E. News which outlined some pertinent facts in connection with the activities and accomplishments of the National Council, Committees and Advisory Board. Mr. Orr concludes his letter with an expression of appreciation to the Officers of S.P.E. for the cooperation of individual members and officers of each section during the year 1947.

The Officers, Committees and Members of the Detroit Section take this opportunity of offering a resolution in praise of the National President, Committees and Advisory Board's efforts for the progress made by S.P.E. during 1947.

RESOLUTION

WHEREAS, the 4th Annual Meeting of the Society of Plastics Engineers, Inc., is to be concluded on Thursday, January 22, 1948, and the National Annual Technical Conference is to be concluded on Friday, January 23, 1948, and

WHEREAS, the Program of Technical Papers, Committee Meetings and business to be transacted, will be outstanding in interest and stimulating to those attending,

Be It Resolved That an expression of thanks and appreciation be adopted and copies thereof be transmitted to each of the persons who have contributed to make this meeting a success;

To President Thomas E. Orr and the National S.P.E. Officers, the Advisory Board Members and Committees who have devoted so much of their time and energy to the work of the Society during the past year;

To the Authors and their associates, who prepared and will present the technical papers, each of which is an outstanding contribution to the art and science of Plastics and related materials;

To the Management and staff of The Engineering Society of Detroit;

Be It Further Resolved That for the untiring efforts of Jesse H. Day, Editor of the S.P.E. News, who has so ably carried out his assignment

(Continued on Page 26)

THREE NEW SECTIONS BOOST NATIONAL SPE

Montreal Section Gives International Scope: Baltimore-Washngton and Indiana Make 27 Sections

NORTHERN INDIANA

Following the original organizational meeting held at the Anthony Hotel on November 20th, 1947, the selected Directors of this section met at Fort Wayne, Ind. on December 21st and elected the following Officers and Directors:

President—Adrian Utzinger, Monsanto Chemical Co., Ft. Wayne, Ind.
Vice.-Pres.—Wayne I. Pribble, General Electric Co., Ft. Wayne, Ind.
Sec.-Treas.—W. H. Mayer, Mayer Industries, Ft. Wayne, Ind.

Directors

R. D. Sevick, U. S. Rubber Co., Ft. Wayne, Ind.
M. H. Buzzee, Industrial Plastics Corp., Elkhart, Ind.
C. L. Piper, Magnavox Corp., Ft. Wayne, Ind.
J. J. Yopst, General Electric Co., Ft. Wayne, Ind.
Walter Schaefer, Wayne Plastics, Ft. Wayne, Ind.
G. L. Lawrence, AGP Corp., Peru, Ind.

MONTREAL, QUEBEC

On December 16th, 1947 meeting at the Montreal Technical School at 200 West Sherbrooke St., Montreal, a group of plastics executives and engineers formed the Quebec Section of the Society of Plastics Engineers.

The following officers were selected from the Board of Directors:

President—H. A. Wilfred Lynch, Modern Plastics Co., P. O. Box No. 2, St. Johns, Quebec.
Vice-President—J. J. Lewis, Delma Plastics, St. Jerome, Quebec.
Secretary-Treasurer—Professor J. A. Major, Montreal Technical School, 200 West Sherbrooke St., Montreal, Quebec.

BALTIMORE - WASHINGTON

The Baltimore-Washington Section of the SPE held an organizational meeting December second, with W. R. Bailey of the Navy Bureau of Ordnance acting as Chairman and Secretary.

A temporary board of directors to lead formation of the section and to process applications for membership is made up of W. deC. Crater, of Glenn L. Martin Co., Peter King of the Naval Research Labs., G. M. Kline of the National Bureau of Standards, Lee Kendrick of Advertising Plastics Co., G. Reinsmith, L. C. Stewart of the Dow Chemical Co., W. R. Sykes of Fiberglas and R. K. Witt of Johns Hopkins University.

Eighteen men were present at this meeting, who heard president Thomas E. Orr and vice-president J. H. DuBois outline the objectives and methods of operation of the SPE.

Formation of this Section is a most important addition to SPE, and is in a position to make invaluable contributions in the case of possible national emergency, and to the plastics industry as a whole.

SOCIETY of PLASTICS ENGINEERS

What It Is and What It Means To Industry

By FRED CONLEY

Past President of SPE and Official SPE Historian

To Detroit goes the honor of starting a nation-wide movement of organizing geographical local sections of the Society of Plastics Engineers, Inc. It began at a dinner party following an afternoon of golf by a group of local Detroit Plastics technical men connected with the plastics industry in one way or another.

Fred Conley

Leading up to this, it had been expressed by a number of people interested in plastics in the Detroit area that some type of organization be formed wherein those people interested in plastics could get together and enjoy an exchange of ideas about the work that was being done.

As a result of this, a golf and dinner party was arranged and a Steering Committee was appointed to meet at an early date to elect directors and officers, which finally resulted in the organizing of the Society of Plastics Engineers, Inc., and before the end of 1942, the Chicago Section was organized.

The first small group in Detroit realized the gravity of the war situation. They knew that it demanded the very best efforts of the entire nation immediately and continuously. Each one who became a charter member knew that he could do more for the war effort than he was doing and almost spontaneously, came the idea of an organized movement, inspired by the crying need of an educational program in the field of plastics, for the industrial engineer in every line of manufacture where plastics were being used and where there was a potential possibility of plastics being used.

So well were their ideas and purposes formulated and put into operation, that today, a little more than six years since the first meeting, there are, at the time this brief history of S.P.E. is being written, twenty-four very progressive geographical sections organized. They are listed in chronological order as to the dates recognized by the National Council.

Section	Name of Section	Date Recognized by Council
1	Detroit	December 31, 1941
2	Chicago	November 1, 1942
3	Cleveland	October 19, 1943
4	Toledo	February 11, 1944
5	Indianapolis	February 15, 1944
6	St. Louis	February 18, 1944
7	Newark	February 20, 1944
8	Milwaukee	May 1, 1945
9	Miami Valley	June 1, 1945
10	Buffalo	July 1, 1945
11	Central Ohio	September 1, 1945
12	Northwestern Pennsylvania	October 1, 1945
13	Philadelphia	November 1, 1945
14	New York	October 1, 1946
15	Western New England	January 1, 1947
16	Rhode Island and S. E. Mass.	January 1, 1947
17	Eastern New England	April 1, 1947
18	Mid-Continent	July 1, 1947
19	Rocky Mountain	July 1, 1947
20	Southern Calif.	July 1, 1947
21	Rochester	October 1, 1947
22	Golden Gate	October 8, 1947
23	Upper Midwest	October 8, 1947
24	Northern Indiana	January 1, 1948

Much interest is being created in other sections of the United States, Canada and Mexico towards the end that engineers are interested in having a section of S.P.E.

Objects

The purpose and objects of the Society of Plastics Engineers, Inc., are set forth so clearly in the constitution that today the members can well be proud to follow the unselfish motives as proposed by the Charter group.

Much credit must be given to the Charter group for their untiring efforts in leading and

(Continued on Page 20)

PLASTICS IN DENTISTRY IS TOPIC AT TOLEDO

By A. E. GIESLER

The November meeting of the Toledo Section featured Mr. Edward McCann, cost accountant of the Owens Illinois Glass Co. Mr. McCann's talk on Cost Accounting dealt with the art in respect to the Plastics Industry. The meeting was held at the Owens Illinois Club Rooms, on November 19th. Mr. McCann was bombarded with many questions that arise in many of the local plants.

A. E. Giesler

The door prize of a good sized Turkey was won by Mr. E. J. Sullivan and was donated by the Peerless Plastics Co.

The December meeting featured Mr. Thomas Moore of the Ransome Randolf Co., of Toledo. Mr. Moore talked on Plastics in Dentistry. Plastic materials have been used in this art since the civil war and Mr. Moore brought up to date the advances that have been made in the field. The lecture was well stimulated with samples and molds. Precision casting was also demonstrated in the lecture.

FLAME-PROOFING OF THERMOPLASTICS TOLD AT PENN.

By N. R. REYBURN

The Northwest Pennsylvania Section held its December meeting on December 11 at the Uthmann Chor in Erie. Thirty-four members and their guests attended.

The dinner was excellent as was the preceding social period. The program was an unusual one for our group. It consisted of what was termed a Gremlin Night in which ten topics of local interest were selected and local members were selected to talk on each topic. Those who spoke were Kling, Bierly, Johnson, Jordan, Reyburn, Stokes, Byrd, and Roche. The subjects covered costs of molds, methods of producing both temporary and production cavities, various ways of removing stock in producing cavities, and chrome plating; for a total of ten topics. In addition L. A. Bierly of the Presque Isle Development Corporation announced that they had successfully worked out the method for flame proofing polystyrene

(Continude on Page 23)

FLUSH GATE TRIMMERS

Injection Molders Supply Company announces the first single purpose flush gate trimmers ever offered to the injection molder for close trimming of gates. These cutters have removable blades to permit re-sharpening, and the pivot pin and holes are cyanided for long life.

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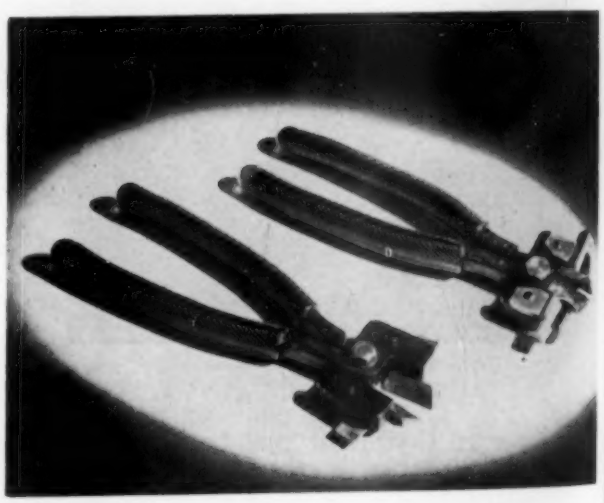

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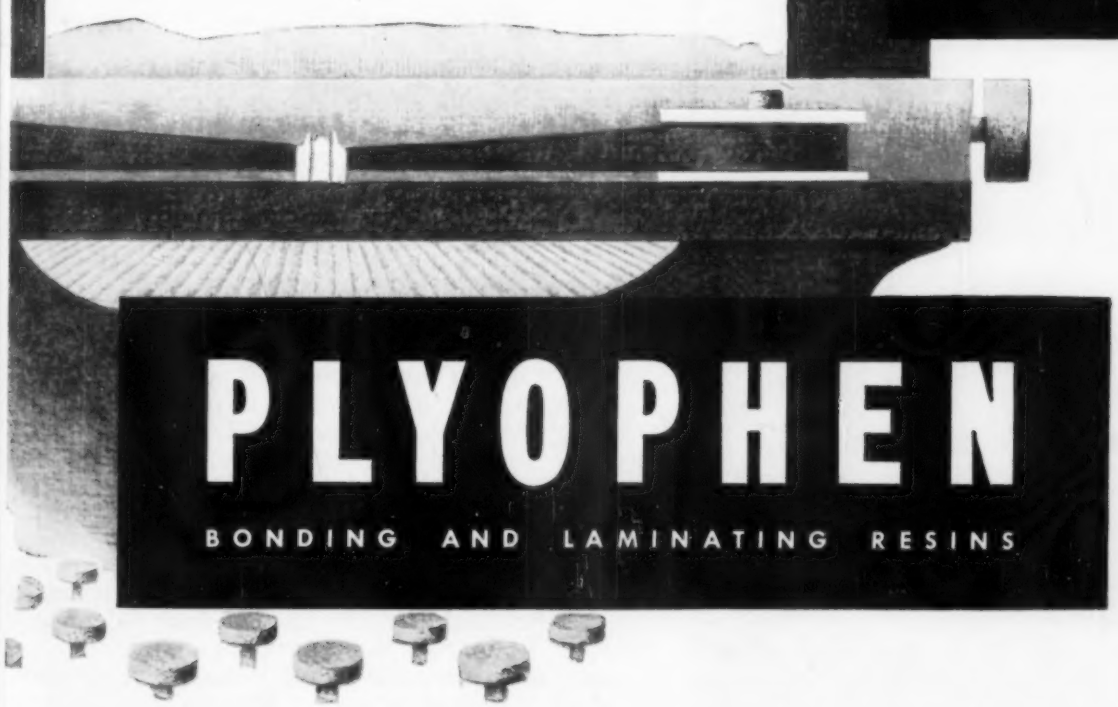

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POLYETHYLENE, VINYLITE MOLDING COMPOUNDS DISCUSSED AT NEW YORK

By WILLIAM SCHACK

J. K. Honish, Development Engineer, Bakelite Corporation, speaking at the December meeting of the New York Section held at the Hotel Sheraton, discussed the development of polyethylene and vinylite as molding compounds.

Pointing out that polyethylene is available in a wide range of formulations from a greaselike compound to a horny, scratch-hard substance, Mr. Honish dealt largely with common formulations which can be molded at 325°-450° F. The higher the temperature, the better the finish, but this factor must be balanced against other conditions of the molding cycle, he said. Citing the Tupper polyethylene refrigerator bowls as an example, Mr. Honish said that the cloudy finish which is usually considered a blemish was capitalized by this company as a virtue. If no strain pattern and no load is imposed, the material does not distort at 227°-234°F, which means that the product will stand up in boiling water.

Although polyethylene is resistant to such powerful acids as HF, it migrates in acetic acid, Mr. Honish declared, so that the effect of mixed acids on it must always be tested. Another limitation of the material — its high shrinkage — need not be a drawback to its use if it is properly allowed for.

Potential applications for molded rigid Vinylite are excellent, according to Mr. Honish, who stressed its chemical inertness and high modulus, while pointing out that its strain release temperature was too low to make it a general purpose material and that it must be considered a specialty material. Comparatively difficult to mold due to its limited temperature range (290°-310° F), Mr. Honish said that this difficulty can be overcome by eliminating flow restrictions through such means as shortened runners.

The non-rigid elastomeric vinyl molding compounds are only at the beginning of their exploitation possibilities, Mr.Honish declared, for products made from them have good wear resistance and other desirable properties over a very wide range of temperatures. The molding technique is also simpler than that for rigid vinyls, the temperature range running from 325°-350° F. It is important to avoid dead spots. Cooperation with machinery manufacturers on cylinder design is very desirable. Chromium plating on steel cylinders is helpful, but some molders, according to Mr. Honish, report a 30% reduction in the molding cycle by using cylinders made of Hastelloy B, which facilitates flow. So far there have been more applications in the extrusion field than in injection molding, and automotive products have loomed large among its uses. The material is also useful in paste form, and it can be cast, injection molded over various types of cores, and slush molded — in which it is possible to produce complex forms with numerous undercuts.

COMPRESSION MOLDING PRESSURES

By C. H. WHITLOCK
Detroit

With phenolic molding materials coming into a more plentiful supply, molders are becoming more critical of the molding properties of these materials. As is often the case very little thought is given to the problem beyond the fact that the material does not happen to mold in a satisfactory manner. Molding technique covers a much broader scope than trying to find a material that works best under borderline conditions of molding.

There are times when molding temperatures and pressures necessary to bring about the success of a molding job are given very little consideration. Quite often the lack of these considerations results in a troublesome job which works only under ideal conditions. Ideal conditions do not encompass, to the extent necessary, the variables of molding press pressures, mold temperatures, preheating of material and molding material tolerances. There must be a factor of safety to take care of all these variables. This factor of safety can, in part, be incorporated in the design of the mold.

Were it possible to set down definite rules for the design of a mold to take care of the conditions encountered, there would be no problem. Because of the fact that every job has to be treated individually, with experience the most important guide to the design, we cannot emphasize too strongly the importance of understanding the few fundamentals of molding technique to assure the maximum of success.

Thermosetting materials mold under pressure of 2000 to 15000 pounds per square inch depending on the type of material, shape of the part to be molded, method of molding and temperature under which molding is done. The belief of many that the type of filler in a phenolic molding compound governs the pressure requirements is not wholly correct. It is true that fillers do affect pressures but on the other hand, it is possible to require the full extremes of molding pressures for a given material on different shapes. It is generally accepted that 2000 pounds per square inch of molding pressure will handle by compression a general purpose wood flour filled phenolic molding compound. This is true only on the simplest of parts requiring a minimum of flow of the material. Greater pressures would be required to mold the same material in a part requiring a long flow of the material during molding, or if transfer molding was the method used. Again if stiff flows are favored to effect the fastest cures, greater pressures are required even for the simpler parts.

Preheating of the molding compound is always advisable as it aids the closing of the mold and disperses the pressure throughout the mold cavity more quickly which will eliminate undue strain on any fragile sections in the mold. Lower pressures can usually be used where preheating is practical. Temperature control of the mold is important. The amount of heat transferred from the heat source to the walls of the cavity to keep a uniform temperature is quite often overlooked. There is no such thing as having too many heat transfer points in a mold. The only thing to watch out for is the placing of the heating medium at points where hot spots will not occur on the mold cavity surfaces. By having a large number of heat transfer plants, a lower temperature in the heating medium can be used resulting in a more uniform transfer of the heat to the cavity and force.

In spite of the large number of variables in determining the proper pressure to be used on a given job, there are some rules which can be used and which from experiences have proven to be helpful. The following pressures which are minimum for a medium flow can be used for materials of various fillers for simple moldings by compression.

Wood Flour	2500 lbs. per square inch
Asbestos (Short fiber)	2500 lbs. per square inch
Medium Cotton Flock	3000 lbs. per square inch

(Continued on Page 15)

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BUECKEN TALK AT CHICAGO DESCRIBES "MILLSTRUDER"

By VAL WRIGHT

H. E. Buecken, National Rubber Machinery Co., Akron, Ohio, was principal speaker at the December meeting of the Chicago Section of SPE on December 2. Mr. Buecken discussed the construction and operating features of extruding machines, illustrating his talk with a series of drawings showing construction details.

Of special interest to those attending the meeting were Mr. Buecken's remarks concerning the Millstruder, a new machine under development by National Rubber Machinery Co. This device, which comprises two smooth rotating rolls within an easily accessible heated jacket, is designed to handle milling and extruding of plastic materials as a continuous operation.

Material fed through an inlet in the jacket is milled by the rolls and extruded at the bottom of the machine. The equipment is cored for oil or steam heating and each roll is separately driven, making it possible to vary the speed differential on the rolls over a wide range. A differential as high as 100 to 1 has been used experimentally, the speaker stated, although sufficient frictional heat may usually be obtained with a speed differential of around 1.2 - 1.4 to 1 between the two rolls.

It is expected that a machine of this type can mill and extrude 350 to 400 lbs. of material per hour; in fact, a much higher output may be obtained with some types of materials, according to Mr. Buecken. Pressures created by this type of equipment are very high, it was stated, but actual figures are not available at this time. The Millstruder can be used for direct extrusion or, if desired, to feed a calendar. It includes provision for carrying away uncontrolled frictional heat by means of air circulation with low pressure blowers.

Material components may be pre-mixed before introduction into the Millstruder or may be placed in the machine separately, Mr. Buecken said. A study is being made at the present time on the most efficient method of injecting the proper proportion of plasticizer into the compound.

Mr. Buecken's talk was supplemented by an actual demonstration of extrusion of vinyl material with a small extruder.

Paul A. Jenkins and Royal L. Stapleton of the Chicago Technical Societies Council explained some of the current work of the council and outlined plans for the forthcoming Chicago Production Show, to be held at the Hotel Stevens on March 23, 24 and 25, 1948. One new feature of the 1948 show will be the grouping of related exhibits to facilitate comparative study of equipment and methods. A registration of 10,000 has been set as the goal of the 1948 conference and exposition. The SPE is to have a booth at the show and will also sponsor a panel of "down to earth" talks on plastics.

Paul Pinscher, Acrilex Sales Corp., New York, gave a brief talk concerning the Acrilex simulated mother-of-pearl material now being offered by his company in the form of sheets in different thicknesses and colors. Sample combs, brushes and other items fabricated from the material were shown.

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PATENTS SUBJECT AT ST. LOUIS

By J. MAVER FEEHAN

The January meeting of the St. Louis Section will be held the evening of Jan. 28, 1948 and the speaker will be a St. Louis Patent Attorney, Mr. Edmund C. Rogers. Mr. Rogers general subject will be "Necessary Procedures in Applying for a Patent" — but he has promised that he will also give a few side lights concerning amusing patents that have come to his attention.

At this same meeting the officers of the St. Louis Section who will take over for 1948 will be elected.

RAKAS TO HEAD RESEARCH

Mr. N. J. Rakas has resigned from the Fisher Plastics Corporation in Newton, Massachusetts to take a position in charge of research and development of plastics and synthetic textiles for National Automotive Fibres, 19925 Hoover Avenue, Detroit, Michigan.

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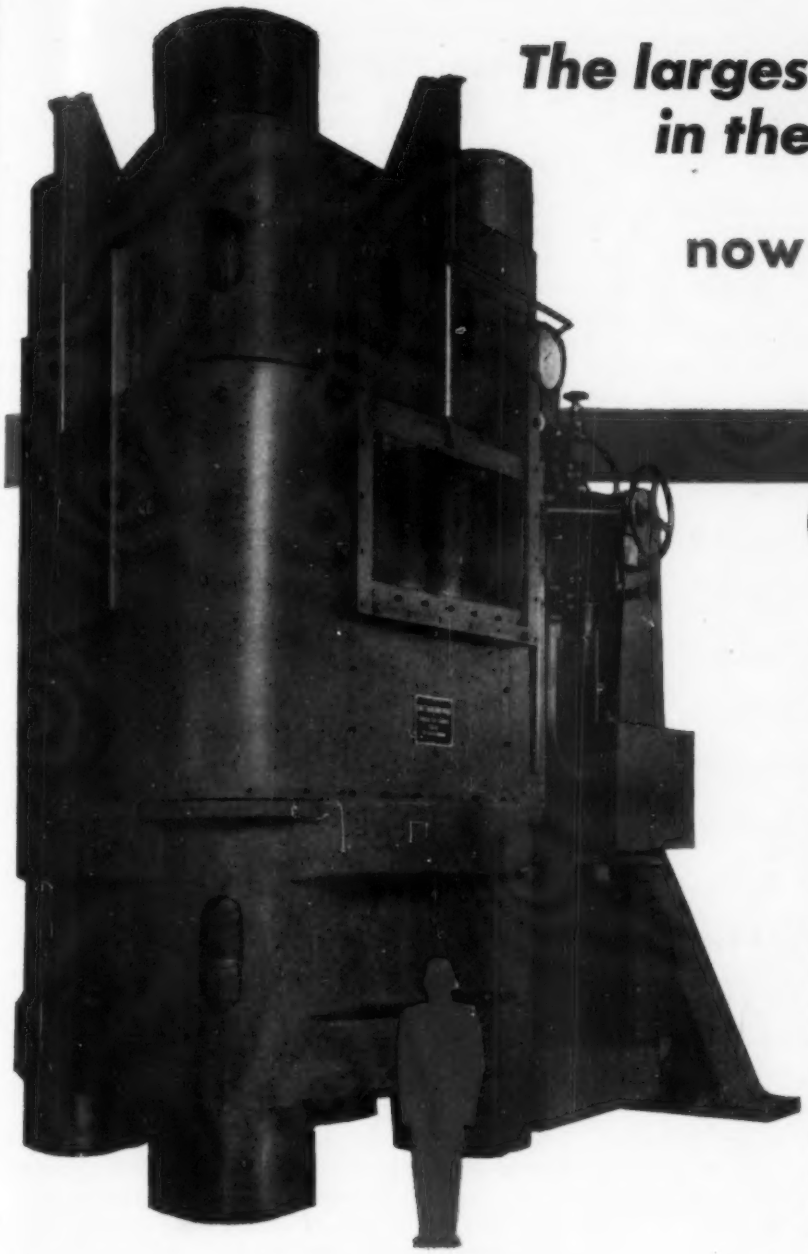

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OFFICERS ELECTED BY CENTRAL OHIO SECTION

By C. W. COOPER

The December meeting of the Central Ohio Section of the Society of Plastics Engineers was held on Friday, December 12, at the Lancaster Country Club, Lancaster, Ohio. Twenty-one members and four guests were present.

The directors convened prior to the dinner for the purpose of electing the officers for 1948.

Officers for 1948 were elected as follows:

President—L. E. Cheyney, Battelle Memorial Institute, Columbus, Ohio.
Vice President—M. W. Burkhart, Plastics Design & Sales Co., Newark, Ohio.
Secretary—C. W. Cooper, Battelle Memorial Institute, Columbus, Ohio.
Treasurer—R. D. Beck, Continental Can Co., Cambridge, Ohio.

All of the above officers serve as directors and the other directors for 1948 are:

H. C. Simons, Ohio Plastic Co., Frazeysburg, Ohio.
N. Roop, Columbus Plastics Products, Inc., Columbus, Ohio.
R. L. Davis, Fabri-Form Co., Byesville, Ohio.
C. D. Jones, Owens-Corning Fiberglas, Newark, Ohio.
B. W. Hively, Consultant, Columbus, Ohio.

Messers Roop, Simons, and Cooper were elected as local section directors by mail ballot, by the society members. R. L. Davis was chosen as national director.

Following the dinner there was a short business meeting, and a movie on Tenite was shown by Mr. Carpenter, a representative of the Tennessee Eastman Company.

The next meeting was held on January 8 at the Wagner House, Newark, Ohio. There was a cocktail hour at 6:30 p. m. through the courtesy of Newark Plastics, Inc. and the Plastics Design and Sales Co.

Following a dinner at 7:00 p. m., special movies were shown and Mr. N. G. Edwards, president of Ohio Plastics Co., Frazeysburg, Ohio, spoke on the general subject of "Where Are We Going?" Mr. Edwards is a popular speaker and has been in great demand for speaking engagements.

NOBLE TALKS AT PITT

Mr. T. W. Noble, Manager of the Plastics Division of Fabricon Products, Inc. gave a talk, illustrated with slides, on "Decorative and Molded Laminates", for the Pittsburgh Plastics Engineers Society at the Mellon Institute in Pittsburgh on Wednesday, December 3, 1947.

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We are starting on our 30th year as Consulting Engineers and Manufacturer's Agents. Our policy has always been:—To meet the highest standards and responsibilities demanded of us by clients, customers and pricipals alike. Our every effort will continue to strengthen that policy and the confidence that has been placed in us.

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PLASTICS MACHINERY IS TOPIC AT R. I. AND S. E. MASS.

Whitehead Discusses Problems of Machinery Design

By FREDERICK P. STEARNS

The December meeting of the Rhode Island and Southeast Massachusetts Society of Plastics Engineers section of SPE was held at the Providence Engineering Society Building on Angell St., Providence, R. I. Approximately 60 members and guests heard Mr. George Whitehead speak on Plastic Machinery and Equipment.

Mr. Whitehead is a Mechanical Engineer and is associated with the Improved Paper Machinery Corp. of Nashua, N. H. His talk covered some of the problems that confront the engineer in his designing of plastic moulding machinery and equipment and particularly the solutions to these problems.

The design of plastic moulding machinery and equipment and particularly injection moulding equipment centers around the physical properties and characteristics of the piece to be fabricated. Thus, each type of piece proves to be a specific application in itself. A number of samples of thermoplastic materials run on injection moulding machines, specifically, were circulated throughout the audience during the talk, and the problems involved in the design of the machine, temperature and pressure characteristics involved in the moulding technique, and proper control of the physical properties of the final product were discussed for each application.

The procedure usually followed by a designer of moulding machinery is to first design and build a suitable mould to create the result desired. Having the mould, he then proceeds to provide suitable gates and runners to insure proper physical characteristics of the moulded piece. His final design of the gates and runners, however, is dependent upon the temperature and pressures of injection. This involves the proper design of the plasticizing cylinder so that the material runs properly. In this regard, problems of voltage regulation and desired wattage at the right spot must be coped with. From this point on, it is merely a matter of trial and error in applying the right temperatures and pressures at the right spots to insure proper running in the mould and proper physical characteristics of the finished piece.

Samples of both large and small pieces of various thermoplastic materials showed the wide variety of jobs made possible by injection machinery.

Following the talk, a question and discussion period took place, during which design for runners, gating, and temperature and pressure control were reviewed in the light of the speaker's as well as the members' experiences.

The next meeting will take place at the Providence Engineering Society Building, Angell St., Providence, R. I., on January 14, 1948.

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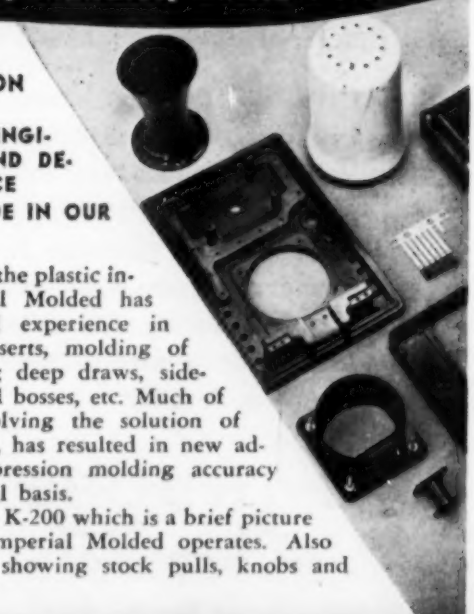

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Ask for Bulletin K-200 which is a brief picture story of how Imperial Molded operates. Also Bulletin K-100 showing stock pulls, knobs and handles.

IMPERIAL MOLDED PRODUCTS CORP.
L. H. Amrine, President
2961 West Harrison Street, Chicago 12, Illinois

Book Review

"The Chemistry and Technology of Plastics" — By R. Nauth

Reinhold Publishing Corporation, New York
522 pages—indexed 1947 $9.50

This book is the answer to the urgent need for a complete explanation of the chemical and physical properties including thermodynamic, statistical, mechanical and general characteristics of plastics and their related materials.

It has been the aim of the author not to confine his efforts merely to individual treatments of plastics and other polymers, but to deal with substances as specific representatives of a general class of chemical compounds characterized by the size, shape and distribution of their molecules. It is somewhat technical in this aspect and assumes the reader is familiar with modern physical chemistry and physics. The author has endeavored to compile knowledge both elementary and academic.

Dr. Nauth describes the intricacies of plastics in simple language. Much of the basic factual material is compiled so that the layman and student will obtain a fundamental textbook knowledge of the practical aspects of plastics. In this respect, no knowledge of physics or chemistry is required for full understanding of that part which does not embrace chemical formulations and terminology.

It is chiefly of value to students, chemists, physicists and engineers interested in this field. It is clearly written and adequately supplemented with tables, pictures, charts, formulae, schematic diagrams and flow sheets, which have been well selected and present established, reliable basic values. The logical treatment of subjects in sequence, together with subdivision of subjects has led to the production of a necessary reference volume for any worker in plastics or related fields. It thoroughly covers the field of plastics in all its phases from the chronological, historical introduction in Chapter One, which orients the reader for a fuller discussion of the modern field of plastics described throughout fifteen chapters written in five sections.

The First Section broadly and thoroughly covers the group of Thermosetting Resins.

The Second Section deals with Thermo-plastic Resins.

The Third Section has two very interesting and informative chapters on Cellulose Plastics.

The Fourth Section covers Synthetic Rubber, Natural Resins and Plywood. The material that the author has compiled in this section on Synthetic Rubber, Rubber-like Plastics and Copolymers is more informative matter than can be found elsewhere in any one volume of literature. Chapter Fourteen of this section on the subject of Resin-Bonded Plywood and Veneer is a text book in itself.

The Fifth Section covers Mold Design and

(Continued on Page 15)

QUICK FACTS ABOUT

Cellulosic Plastics

WHAT ARE CELLULOSIC PLASTICS?

By far the most widely known and most useful of the cellulosics are Cellulose Acetate, Ethyl Cellulose and Nitrocellulose. The cellulosics as a group are adaptable to extremely diversified product uses, and to a variety of fabricating processes. These include high-speed injection molding, screw extrusion, casting, machining, deep drawing, and blowing. The cellulosics may be incorporated with non-plastic products by laminating, or by coating or impregnating with solutions. Thus, manufacturers and fabricators can readily select a method which meets their particular needs most economically and effectively, and take advantage of the cellulosics' unique combination of properties.

Hercules Powder Company is a major producer of the high quality cellulose derivatives used in the manufacture of cellulosic plastics. These basic raw materials are processed by manufacturers of plastic materials who, in turn, supply molding powders to molders, extruders and fabricators ready for processing into finished plastic products.

WHAT ARE THEIR PROPERTIES?

It is the unique *combination* of many desirable properties inherent in the cellulosics, plus the adaptability of these materials to a variety of fabricating processes, which has made cellulosic plastics the most useful of *all* plastics.

Toughness is an outstanding feature of the cellulosics, and one which every plastics buyer should look for. Cellulosic plastics have high impact strength. They are resilient where other materials shatter. This lack of brittleness is assurance against undue loss through breakage, cracking, and chipping in manufacturing, and assembly and in service.

Dimensional Stability of the cellulosics, or their ability to retain their original shape when subjected to moisture, heat, or mechanical shock, has been demonstrated time and time again. Typical applications of cellulose acetate, for example, are hair brushes, fish lures and toothbrush handles. Special flame- and heat-resistant cellulose acetate plastic vacuum cleaner and electric mixer housings have passed Underwriters' Laboratories' tests. Cellulosic plastics provide a firm anchorage for metal inserts.

Chemical Resistance is another plus for the cellulosics, making these plastics practical where finished products are subjected to oils, greases, gasoline, weak acids, or certain organic solvents. Where necessary, cellulosic plastic products can be easily cleaned.

Flame and Heat Resistance. Now, for the first time, new types of cellulose acetate enable thermoplastic housings for electrical appliances to pass Underwriters' Laboratories' rigid flame and heat resistance tests.

Electrical Properties. Cellulosic plastics are good non-conductors, and insulators. This property, plus outstanding physical properties such as toughness, dimensional stability, and chemical resistance assures plastics buyers of a high degree of safety and durability in electrical accessories and appliances.

Color. Cellulosic plastics meet every color requirement of effective merchandising and eye-appeal. Deep solids, crystal transparencies, beautiful translucents, soft pastels, and rich opaques enable the plastics buyer to obtain a variety of fast-moving cellulosic products. And the versatility of cellulosic plastics makes possible an unlimited and unique range of color variegations and mottled effects. The color and luster of these finishes is protected by the cellulosics' resistance to grease, moisture, and cleaning solvents.

Light Weight is an important advantage of many plastics, but it need not mean sacrificing strength, stability, and other equally important factors. Cellulosic plastics are not only extremely light in weight but provide products with an ideal "save and sell" combination of other properties.

Economy in the purchase of plastics or plastic parts starts with the selection of a base material that has the right combination of properties. Cellulosic plastics offer an unusually well-balanced combination of toughness, dimensional stability, chemical resistance, flame and heat resistance, electrical properties, color, light weight, and workability. These properties mean products that cost less to make, are easier to sell, and easier to *keep* sold.

Write for names of plastics materials manufacturers who can tell you where to buy products made from cellulosic plastics.

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"OLD AAA TRAVELER" TALKS AT DETROIT; PRIZE PAPER WINNERS ANNOUNCED

By FRANK ABBOT

The Detroit Section of S.P.E. held their December and Christmas Party meeting in combination with the Detroit Rubber and Plastics Group on Friday, December 12. This is the second year that these two groups have held their December meeting jointly. The attendance was most gratifying as some 410 persons were present.

Mr. J. P. Welsh, an "Old AAA Traveler" gave an interesting talk on "This Amazing America". It was certainly a stimulant to those present to "See America First". Entertainment was provided with a variety of vaudeville acts and singing of the old songs by all. Movies helped add to the pleasure of the evening.

The Detroit Section wishes to announce the winners of the Prize Paper Contest.

FIRST PRIZE—$100.00. Mr. R. R. Holman, Fabricon Products, Inc.
"Variables Affecting the Bond Strength of Laminated Plastics".

SECOND PRIZE—$50.00. Mr. N. W. Trepanier, Reichhold Chemicals, Inc.
"Continuous Viscosimeter for the Production Control of Resins and Plastics".

THIRD PRIZE—$25.00. Mr. R. F. Wint, Hercules Powder Company.
"The March of Cellulosics".

NON MEMBER PRIZE—A Plastic Encyclopedia. Mr. M. F. Bendzick,
AC Spark Plug Division, General Motors Corporation.
"The Development and Manufacture of Acrylic Panel Faces".

The decision between first and second prize was so close that the committee has requested a judgment of both papers for the National Award.

We have donated a sum of money to Wayne University Research Laboratory for work to be conducted on Plastics.

The Detroit Section of S.P.E. wishes all other Sections and their members a Very Happy and Prosperous New Year.

BARRIER, PRIBBLE CO. FORMED

Formation of a new Consulting Engineering company, Barrier, Pribble and Co., P. O. Box 55, Fort Wayne, Indiana has been announced. W. I. Pribble is co-author with J. H. DuBois of the book Plastics Mold Engineering, has been for 6 years a product engineer of the Plastics Division of General Electric Co., of Fort Wayne, and is a journeyman machinist-toolmaker. A. L. Barrier is a chemical engineer, graduate of Texas U. He was for eight years with the Plastics Division of General Electric as section head in compound development, and is a registered professional engineer in Indiana.

They will offer consultation, product design, and tool design as their services.

COMPRESSION MOLDING

(Continued from Page 7)

Asbestos (long fiber) 3000 lbs. per square inch
Fabric and Cord 4000 lbs. per square inch

These pressures can be varied up to 20% either way where soft or stiff flow materials are used. For more complicated moldings requiring a long flow for the material, such as a radio cabinet, the above pressures must be increased by the following values for each inch of height of flow based on an average wall section.

Wood Flour	600 lbs. per square inch
Asbestos (short fiber)	600 lbs. per square inch
Medium cotton flock	800 lbs. per square inch
Asbestos (long fiber)	800 lbs. per square inch
Fabric and Cord	1000 lbs. per square inch

In practice let us apply the above values to a radio cabinet job with a projected molding area of 60 square inches and a draw of 6 inches. The cabinet is to be made of a wood flour filled compound. From the above tables our pressure requirements are 2500 pounds per square inch for the projected area plus 600 pounds per square inch of each inch of height.

2500+(600 x 6) x 60 equals 366,000 pounds

It will require a pressure of 183 tons to mold this cabinet. These figures will have to be varied for unusual thin sections or where soft or stiff flows are used. Furthermore proper mold temperatures have to be maintained and preheating of the molding materials is advisable.

It is concluded that a margin of safety be figured in molding pressures to take care of the variables in molding conditions and raw material manufacturing tolerances. To load a press to the limit usually results in a large percentage of rejects and added finishing costs. It is also concluded that adequate heating facilities under proper control incorporated in the mold will tend to lessen the problem of molding.

BOOK REVIEW

(Continued from Page 12)

Equipment and much informative material on Molding Processes and Finishing of Moldings.

The Appendix and Glossary fill twenty-one pages and are most complete; giving definitions of the common chemical and technical terms used in the plastics industry, as well as tables of weights, which in most of their physical characteristics have been checked and approved by National Bureau of Standards. There is a page devoted to specific gravities of materials. A page on mensuration of Formulae. There are five pages of Plywood Glossary. Every subject matter throughout the entire book has been most carefully indexed.

Raymond Nauth has drawn heavily on others of various industries and institutions for the fund of knowledge compiled in this book.

A Consultant in Plastics, Dr. Nauth is a Consulting Engineer and a member of The Engineering Society of Detroit, American Society of Tool Engineers and Society of Plastics Engineers.

Fred Conley.

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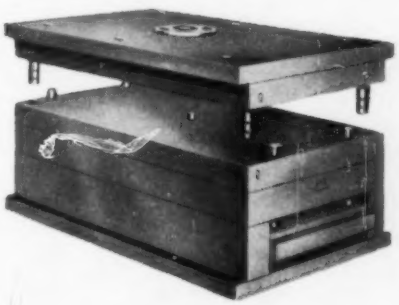

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C. Frosch, *Speakers*

H. J. McGowan, *Program Publication*

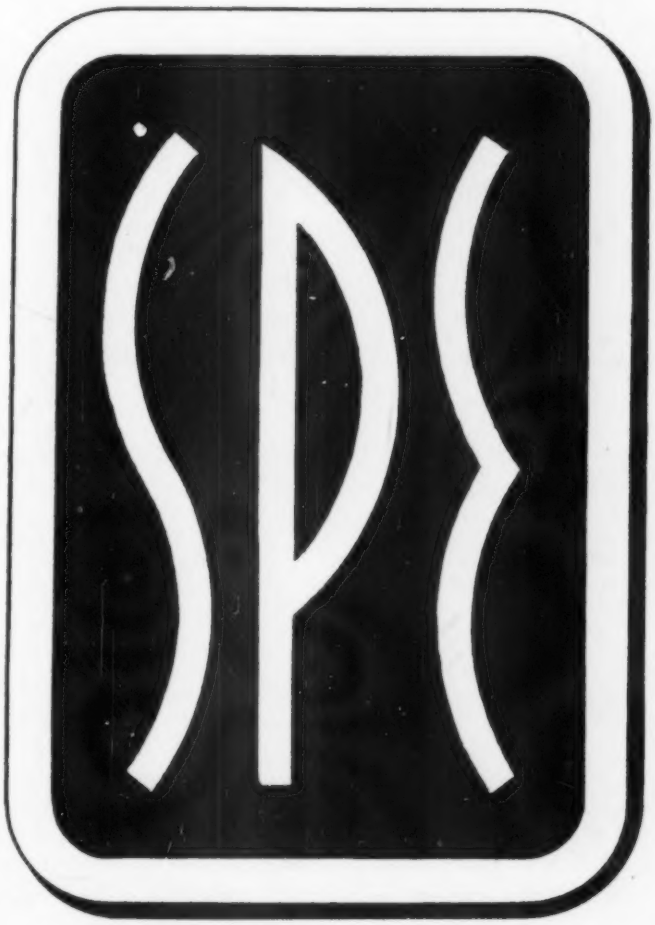
(Continued on Page 18)

PROGRAM

of the 4th

NATIONAL CONFERENCE

Detroit, Michigan



Jan. 21-23, 1948

Society of Plastics Engineers

at the Rackham Memorial Building

Wednesday Morning, January 21, 1948

CARL J. FROSCH, Presiding

W. M. Phillips

J. Bailey

E. J. Marslek

L. E. Cheyney

1. 9:30 **WELCOME TO S.P.E.—PLASTICS IN THE AUTOMOBILE INDUSTRY. W. M. Phillips and A. C. Nixon** — General Motors.

   Mr. W. H. Phillips—Chem. Eng. degree University of Pennsylvania; has been associated with Phillip Carey Co. at Cincinnati, and Baltimore Lubs Co. at Baltimore. He became successively Chief Chemist and General Mgr. of the Electric Plating Division of the tube company which later grew into the Inlae Mfg. Co. at Detroit. He joined his present employer, the General Motors Corp., in 1919, in an advisory capacity for plating, painting and enameling. Present works consist of research on rubber, plastics, and electroplating. He has been National President of American Electroplaters Society and a national director of the Society of the Plastic Industry. And most important, the second president of the National Society of Plastics Engineers, Inc. During World War II he was associated with the Manhattan Project and the Interim Fire Committee.

2. 9:30 **STRETCH ORIENTATION OF POLYSTYRENE AND ITS INTERESTING RESULTS. J. Bailey** — Plax Corporation.

   James Bailey—Vice President and Research Director of the Plax Corporation, Hartford, Conn.—Degree of Mechanical Engineering from Lehigh University—Corning Glass Works 1912 to 1929—Bailey & Sharp Co., Consultants 1929 to 1937—Plax Corp. 1937—Member American Ceramic Society, Chairman Glass Division 1934, A.S.M.E., Chemist Club of N. Y.—published 20 articles on glass and plastics granted 22 patents on glass and plastics—hobbies fishing and wood carving.

3. 10:00 **DESIGN AND FINISH REQUIREMENTS ON MOLDS FOR THE PRODUCTION OF PLASTIC LENSES. E. J. Marslek**—Acme Scientific Company.

   Emil J. Marslek—Vice President of Acme Scientific Company, Chicago, Illinois—B.S. in Mechanical Engineering from Illinois Institute of Technology — Assistant to Vice President of Acme Industrial Co.

4. 10:30 **PLASTICIZERS IN THE PLASTICS INDUSTRY. L. E. Cheyney** — Battelle Memorial Institute.

   L. E. Cheyney—Assistant Supervisor of resin and rubber research of Battelle Memorial Institute, Columbus, Ohio—B.S. in Chemistry from the University of Akron, M.S. in Chemistry from the University of Pennsylvania, Ph.D. in Chemistry from Ohio State University—industrial experience with B. F. Goodrich Co. and Goodyear Tire and Rubber Co., Battelle in 1945—member A.C.S., S.P.E. and A.S.T.M., Secretary of the National Advisory Council.

5. 11:00 **STYRENE POLYMERS AND COPOLYMERS FOR INDUSTRY. R. Fordyce**—Monsanto Chemical Co.

   R. Fordyce (Reid R.)—Sales Development Manager, Plastics Division, Monsanto Chemical Co. Sept.

R. Fordyce

P. S. Olmstead

1947—born in Canada—B.S. and M.S. in Chemical Engineering from the University of British Columbia, Ph.D. Chem. from McGill University 1939—high polymer research chemist Monsanto 1939, group head 1945.

6. 11:30 **THE CONSUMER LOOKS FOR QUALITY. P. S. Olmstead**—Bell Telephone Laboratories, Inc.

Paul S. Olmstead — B.S. from Princeton,, Queen Fellow 1920-1922, Ph.D. Princeton—Research Physicist, Western Electric Company 1920, Bell Telephone Laboratories, statistical consultant for station apparatus development, 1936—fellow A.A.A.S., Physical Society, Statistical Assn. (Chairman 1945), Institute Math. Stat., Society for Quality Control (Director 1945), A.S.T.M. and many others—Published 17 papers on various subjects.

Thursday Morning, January 22, 1948

GUNNAR LINDH, Presiding

S. K. Moxness

J. Formo

F. L. Yerzley

P. M. Koons

7. 9:00 **THE PRODUCTION ECONOMICS OF PRESS DESIGN. H. M. Richardson**—DeBell & Richardson.

Henry M. Richardson—Treasurer of DeBell & Richardson, Consulting Engineers, Springfield, Mass.—Degree in Electrical Engineering from the University of Colorado—General Electric Co. 1925-1943, Commercial Engineer in charge of molded and laminated plastics 1928-1936, Chief Engineer 5 plants 1936-1943.

8. 9:30 **PRESENT DEVELOPMENTS IN STEAMPREHEATING OF PHENOLIC MATERIALS. S. K. Moxness & J. Formo**—Minneapolis Honeywell Regulator Company.

S. K. Moxness—Chief Process Engineer of Minneapolis Honeywell Regulators Co., Minneapolis, Minn. J. Formo—Supervisor of Plastics Laboratory.

9. 10:00 **INDUSTRIAL USES FOR NYLON. J. E. Teagarden**—E. I. du Pont de Nemours & Company.

J. E. Teagarden—Technical Service for E. I. du Pont de Nemours & Co., Arlington, N. J.—B.S. from West Virginia University and Waynesburg College, Ph.D. from Ohio State University—du Pont 1941; 5 years in Research and Development Department of Chemical Division.

10. 10:30 **THE THEORY OF COLORIMETRY AND ITS APPLICATION TO COLOR STANDARDIZATION. Miss D. Dolton**—Interchemical Corporation.

Miss Dorothy Dolton—Head of Colorimetry Department 1945 of Interchemical Corporation, New York, N. Y.—B.A. from Barnard College, Interchemical Corp. 1942.

11. 11:00 **METHODS FOR INDUSTRIAL COLOR STANDARDIZATION. P. M. Koons**—The National Cash Register Company.

Paul M. Koons—Head of Industrial Design Department of The National Cash Register Company. Dayton, Ohio — design 2 years Aladdin Manufacturing Co., 8 years Delaware Engraving Co., 2 years Glascork Brothers, 8 years Frigidaire Division of General Motors, The National Cash Register Co. in 1944

12. 11:30 **MYCALEX-410 GLASS BONDED MICA IN MOLDED FORM. Dr. F. L. Yerzley** — Mycalex Corp, of America.

12:00 **ANNUAL MEETING**

2:00 **OPEN FORUM** on Plastics in the Automotive and Refrigeration Industries.

Friday Morning, January 23, 1948

L. E. CHEYNEY, Presiding

O. L. Pierson

F. W. Reinhart

A. H. Dietz

J. Searer

13. 9:00 **FABRICATING OF HEAT-RESISTANT PLEXIGLAS. O. L. Pierson**—Rohm & Haas Company.

O. L. Pierson—Head of Plastics Applications Laboratory of Rohm & Haas Company, Phil., Pa.—Graduate of the University of Nebraska, M.S. and Ph.D. in Mechanical Engineering from Rensselear Polytechnic Institute — Analytical Engineer with Babcock & Wilcox Co.. Development Engineer in Ansco Photographic Division of General Aniline, Rohm & Haas Co. 1941.

14. 9:30 **A NEW ATTACK ON THE DEGRADATION OF PLASTICS. F. W. Reinhart**—National Bureau of Standards.

Frank W. Reinhart—Asst. Chief, Organic Plastics Section of the National Bureau of Standards. Washington, D. C.—B.S. in Chemistry, Physics and Mathematics from Juniata College, has taken graduate courses at Columbia University, University of Maryland and N.B.S. Graduate School—taught college chemistry 7 years, Nat. Bureau Stds. 1937—member A.C.S., Washington Academy of Sciences, A.S.T.M., American Physical Society-Hobbies stamp collecting, gardening, photography and swimming.

15. 10:00 **STRESS - TIME RELATIONS IN PLASTICS. A. H. Dietz**—Massachusetts Institute of Technology.

Albert G. H. Dietz—Associate Professor of Structural Engineering and Materials in the Department of Building Engineering and Construction at MIT and Director of the Plastic Research Laboratory—Ph.D.

16. 10:30 **DUREZ PHENOLIC RESINS IN SYNTHETIC AND NATURAL RUBBER. J. Searer**—Durez Plastics & Chemicals, Inc.

J. C. Searer—Durez Plastics & Chemicals, Inc., Research Division. B.S. in chemistry Franklin and Marshall College 1937, Ph.D. in chemistry Northwestern University 1941.

17. 11:00 **SOME RECENT PHASES OF FABRICATING TECHNIQUES. J. W. Knight**—Fabri-Form Co.

J. W. Knight

Graduated in Electrical Engineering from Michigan State College in 1931 and up till 1940 spent his time in the manufacture and engineering of major electric appliances. In 1940 he entered the plastic field in an engineering and manufacturing capacity with the Reynolds Spring, Molded Plastic Division at Cambridge, Ohio. He set up the fabrication repartment for that company and headed it until 1943 when he formed The Fabri-Form Company for fabrication of aircraft windows and enclosures. The company has risen to be one of the important sources for fabrication of all kinds of parts made from sheets, rods and tubes of plastic materials and serves all branches of industry today.

Winners of National S.P.E. Prize Paper Contest:

18. 11:30 First Prize Paper.
19. 12:00 Second Prize Paper.
20. 12:30 Third Prize Paper.

Equally Beautiful and Durable...

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INTERLAKE *Phenolic Compounds*

7 Basic Types of INTERLAKE Molding Compounds

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Improved General Purpose
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The Kromex Corporation, a leader in outstandingly styled housewares, specified phenolic compounds for the handles and knobs of their saucepans. They recognized that the durability, attractiveness and heat-resistance of phenolics made them ideal for this product.

So their molder, International Molded Plastics, Inc., makes the parts from Interlake Compounds. Interlake powder is used because it is fast-curing, consistently uniform and has good mold-release qualities . . . Due to these important advantages, Interlake Molding Compounds are being used in more and more of America's finest products.

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NATIONAL CONFERENCE COMMITTEES

John Koons, *Exhibits, Chairman*

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A. D'Agostino, *Sec.-Treas.*

P. B. Lillis, *Hotels*

C. H. Whitlock, *Registrar*

G. Lindh, *Speakers*

W. R. Walsh, *Publicity*

P. F. Robb, General Vice Chairman; Karl Kithil, Reception

NEWARK DISCUSSES UREAS

By EDWARD B. SOULES

The Christmas spirit dominated the December meeting of Newark Athletic Club. With Tom Schlitz at the piano everyone joined in the singing of Christmas carols. Lucite salad servers, molded and donated by Sterling Plastics of Union, N. J., were distributed to each member and guest. Silvered polystyrene Christmas tree spires molded by Culerk Co. of Flanders, N. J., were also donated as favors by Max Eckert Co. of North Bergen, N. J. Tom Orr, national president, was among the guests present at the meeting.

The business portion of the program was devoted to "Ureas vs. Melamines," a subject so highly regarded that it was handled by four speakers: Dr. Bigelow and Mr. J. Joyce of Plaskon Division of Libbey-Owens-Ford Co., and Mr. W. Ward and Mr. P. Fuller of Plastics Division of American Cyanamid Co. Dr. Bigelow, in rare form, headlined the discussion and left no doubt as to "what every plastics engineer should know" about ureas.

The nominating committee submitted the following names as candidates for new directors of Newark Section:

Dr. Russell B. Akin of the DuPont Co.

Dr. T. Smith Taylor of the U. S. Testing Co.

Edward B. Soules of the Detroit Mold Engineering Co.

Gilbert L. Peakes of the Bakelite Corp.

Joseph L Bonanno of the Lionel Corp.

Donald W. Biklen was announced as the winner of Newark Section in the S.P.E. Prize Paper Contest. Mr. Biklen will receive a cash award of $100.00, and his expenses will be paid to the National Conference meeting at Detroit in January, where his paper will be presented. Don is a graduate of Iown State College and later studied at Brooklyn Polytech, Pratt Institute, and Newark School of Fine and Industrial Arts. He was with the Plastics Division of the General Electric Co. until he became Ordnance Engineer with the U. S. Government in the plastics research and development laboratory at Picatinny Arsenal, Dover, N. J. He is now product engineer with Shaw Insulator Co.

Effective December 15th, M. R. Gerow, president of Newark Section, became Sales Manager of the Plastics Division of Reynolds Metals Co.

A company is known by the customers it serves!

ENGINEERING SPECIALTIES CORPORATION has designed, engineered and produced highly intricate types of precision-built plastic molds for many of the most prominent molders in the country. A list of our principal customers will be supplied on request.

» » In our organization are nationally known authorities on plastic molds and molding. Their long experience in this field has repeatedly proved to be of great practical value to our clients.

» » We are prepared to give you ***prompt delivery*** on any type of mold you require. Your inquiry will receive immediate attention from our designing and consulting division. Phone, write or wire today.

esc

Engineering Specialties Corporation

3476 Gibson, Detroit 1, Michigan

PRECISION-BUILT PLASTIC MOLDS

COMPRESSION · INJECTION · TRANSFER

SPE AND INDUSTRY

(Continued from Page 3)

promoting the Society in its infancy. The records show that many meetings of the original officers and directors were necessary to organize the S.P.E. into a National Society.

During the period of organization of the S.P.E. in the Detroit Section, it was most reassuring to observe that not only those who were eligible to membership showed a real interest, but other key men and officials in other industrries seemed to have been inspired by their confidence in a group of individuals interested in a common cause, to promote the industrial betterment pertaining to the designing, engineering and standardizing and generally the wide use of plastics wherever practicable; and so much so that many of those individuals applied for membership. In some cases the Detroit Section was forced to vote in disfavor of their election to membership.

The purposes of the Society are to promote in all lawful ways the Arts, Sciences, Standards and Engineering practices connected with the design, construction and utilization of products and components of units of any type of apparatus, mechanical or otherwise or in any form whatsoever, that may use thermosetting plastics or thermoplastics or the laminates of plastics or any of their allied products.

To exchange information among members; publish a Society magazine and bulletins; collect and disseminate information that promotes the scientific pursuits of the plastics industry.

Through its distinguished membership during the past six years, the S.P.E. has unceasingly endeavored to uphold the ideals of engineering leadership, scientific procedure and research in the fields of plastics and their allied products through the technical activities and sub-committees. In these fields, today of paramount importance and interest, the Society has enjoyed preeminent recognition among the country's leading industries for the presentation of genuine contributions to the concepts of Plastics Material Standards and Plastics Process Standards.

That the Society shall always retain its significantly representative character as a true cross-section and forum of thinking plastics engineers, remains the guiding principle of the National Officers and Directors. To this end, invitations are tendered by the S.P.E. to interest engineers in various manufacturing plants in industry, other than the Plastics industry, in any geographical section of the country to become members.

To its attraction for engineering minds the Society attributes its success in the promotion and organization of the various geographical sections now functioning.

Membership Is International

The Society has on its roster in each local section, members from widely scattered points of the country from the Pacific Coast to the Atlantic and from the Gulf of Mexico to Toronto, Canada. Such a body of members must exert a profoundly beneficial influence on free enterprise.

Intelligent Engineering Necessary

Many readers may conceivably disagree with the expressed thoughts of the desirability and deserving need of intelligent understanding of plastics in the engineering brains of their organization—in fact, it would be difficult to find unanimous opinion in regard to this contention.

In the engineering of a new product, there are "essentials" in the educational as well as the material field.

If we compare a new product utilizing plastics as a component or wholly as a unit that is well engineered by some individual, who intelligently understands plastics, with the same product that is poorly engineered by someone sadly lacking of an intelligent understanding of plastics, it is soon evident why the one is succeeding and the other is failing. The cause of failure can only be that the product was engineered by one not putting his mind on the problem and letting things go wrong by default.

Since the war, industry has drawn from the engineering field new blood and fresh minds who have taken advantage of every opportunity to glean from every possible source a full knowledge of plastics.

In short, in the knowledge of plastics, a determined individual can make progress without such help as college training might have afforded him.

(Continued on Page 23)

BETTER MOLDS

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BETTER MOLDED PARTS

Injection — Compression — Transfer

If Plastic Molds are your problems and delivery of these molds are a great factor, our Engineering Department and Mold Plant are in a position to serve you in designing and building of your Molds.

Your Inquiries Will Receive
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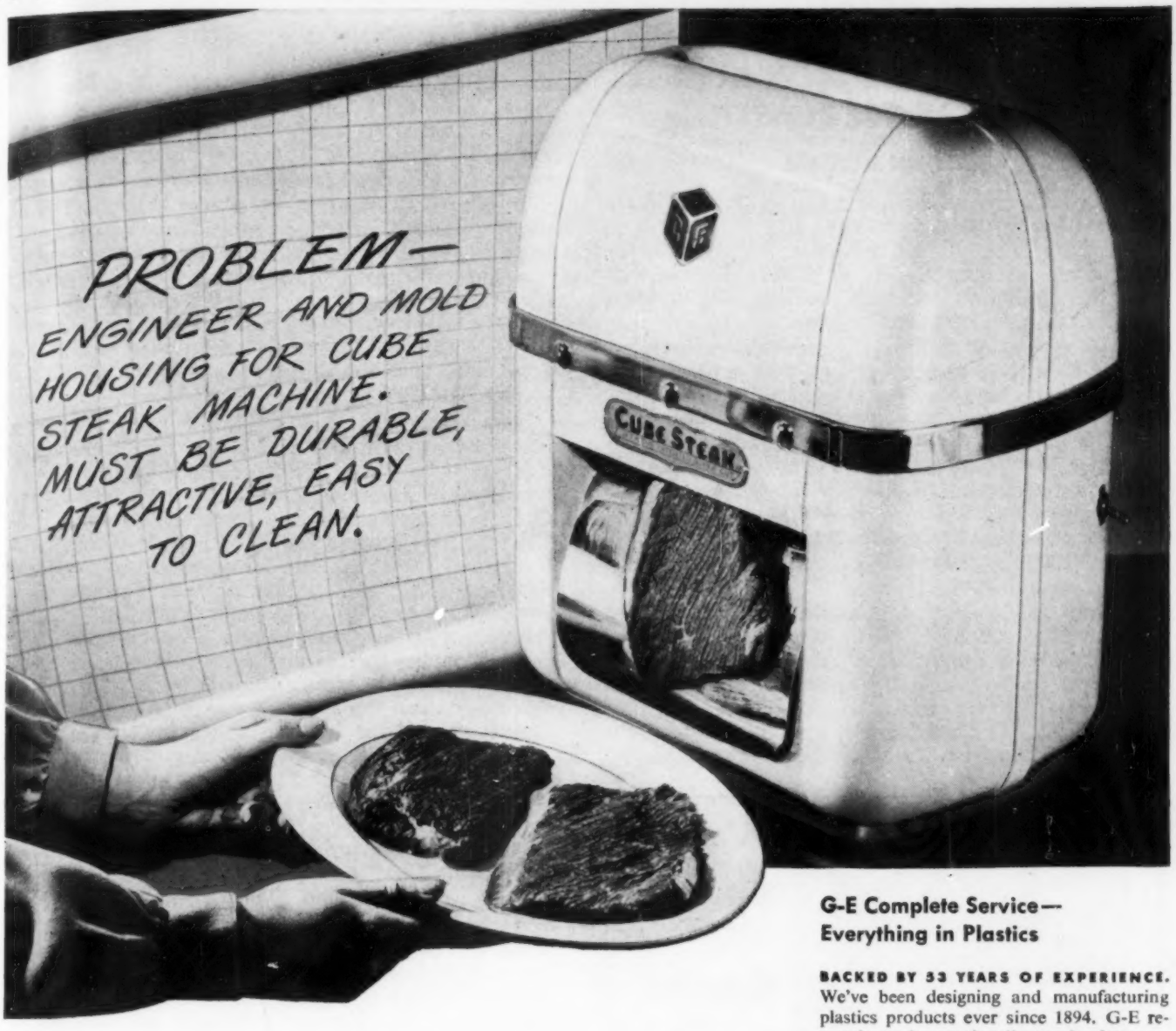

Have you a steak in plastics?

• Here's a case where plastics contribute to good eating—by forming an attractive, resistant, easy-to-clean housing for this new cube steak machine. It was engineered and molded by General Electric for the Cube Steak Machine Company, Inc., of Boston, Massachusetts. The gleaming white plastics surface resists the action of meat juices and cleaning agents—stays lustrous and beautiful despite the wear and tear of everyday use.

Are *you* taking full advantage of plastics? Whether you make steak machines, lipsticks, or locomotives, General Electric's *complete* plastics service is equipped to design, engineer, and mold plastics to meet your individual requirements. The world's largest molder of finished plastics products, G. E. works with all types of plastics materials—can recommend without bias the best one for your particular job.

May we send you, free, the full-color booklet, "Problems and Solutions in Plastics"? Just write Plastics Division, Chemical Department, General Electric Co., 1 Plastics Avenue, Pittsfield, Mass.

G-E Complete Service—Everything in Plastics

BACKED BY 53 YEARS OF EXPERIENCE. We've been designing and manufacturing plastics products ever since 1894. G-E research works continually to develop new materials, new processes, new applications.

NO. 1 PLASTICS AVENUE—complete plastics service—engineering, design and mold-making. Our own industrial designers and engineers, working together, create plastics parts that are both scientifically sound and good-looking. Our own toolrooms are manned by skilled craftsmen—average precision mold experience, 12 years.

ALL TYPES OF PLASTICS. Facilities for compression, injection, transfer and cold molding . . . for both high and low pressure laminating . . . for fabricating. And G-E Quality Control—a byword in industry—means as many as 160 inspections and analyses for a single plastic part.

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GENERAL ELECTRIC PLASTICS FACTORIES ARE LOCATED IN DECATUR, ILL., COSHOCTON, OHIO, MERIDEN, CONN., SCRANTON, PA., TAUNTON AND PITTSFIELD, MASS.

EVERYTHING IN Plastics

MIAMI VISITS KURZ-KASCH, HEARS DR. BENTIVOGLIO ON CELLULOSE PLASTICS

By JOHN RUSSELL

The first event of the new year, 1948, for Miami Valley Section, SPE members, was a dinner and plant tour through Kurz-Kasch, Inc., plant on Thursday, January 8 H. J. (Bud) Kasch, Jr., was the chairman for this meeting and a very worthwhile program was enjoyed.

A short business meeting was also scheduled and at this time announcement was made of the results of the balloting for the three new directors and officers for 1948. Nominated for directors are the following: Walter F. Oelman, Standard Molding Corp., Dayton; John L. Russell, National Cash Register Co., Dayton; F. E. Schneider, Inland Mfg. Div., Dayton; Robert Gerdes, Plastic Moldings Corp., Cincinnati; Carroll Jensen, Kurz-Kasch, Inc., Dayton; and Martin Kasch, Kurz-Kasch, Inc., Dayton.

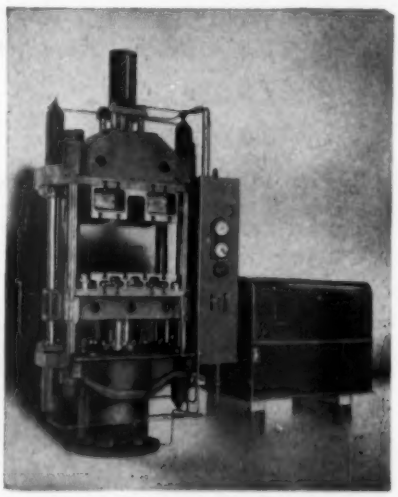
Miami Valley Section is again signally honored by our National SPE organization in the selection of a Dayton man, Mr. P. M. Koons, Industrial Designer, National Cash Register Co., to talk on "METHODS FOR INDUSTRIAL COLOR STANDARDIZATION" at the National Technical Conference of the SPE to be held in Detroit at the Rackham Memorial Bldg., January 21-23, 1948. Last year's Dayton representatives on the National SPE program in Chicago, G. J. Wilson and B. W. Nelson, of the National Cash Register Co., have authored an article "HOW NCR SPECIFIES AND TESTS PLASTICS", published in the December, 1947 issue of "Plastics" magazine.

It is well to mention here now that 1947 is no more, that the growth in attendance at the meetings during the past year has been in large measure due to the untiring and zealous efforts of Chester Krueger who has been on the job constantly as Program Coordinator. The direct result of his labors has been better organized programming and more interesting meetings. Good work, Chester!

Jack Braden is to be highly commended for the very entertaining social meeting of December 4th at which time the wives and friends of the members were present at the Miami Valley Golf Club. Speaking for the special benefit of the ladies, Dr. Marie Bentivoglio, coordinator of Technical Data for the Plastics Division of the Celanese Corp. of America, presented a very clear description of the Cellulose Plastics. Supplemented with display samples, she explained how our clothes, fabrics and many articles in every day use that are manufactured in industry result from cellulose "dope" and molding powder. Dr. Bentivoglio spent her early life in Australia, attended the Uuniversity of Sydney and while in England was awarded the first doctorate ever accorded a woman by Oxford University. She has lectured all over the United States for the National Geographic Society and is at present serving as Chairman of the Education Committee of the Society of the Plastics Industry.

In conjunction with the meeting a style show with the latest trends being shown, was staged by models from the Rike-Kumler Co. Miss Lorna Cooper, Rike's new Fashion Coordinator, was the narrator. Miss Cooper formerly did fashion research work, was engaged in the standardization of colors for the Bakelite Corp. and prior to the war was on the faculty of Pratt Institute in Brooklyn, N. Y. as well as being a member of the McCall Style & Beauty Staff.

A buffet lunch concluded a very pleasant evening and a worthwhile program.



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HYDRAULIC PRESSES FOR

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RUBBER LAMINATES VINYLS
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ACCUMULATORS - HOT PLATES
HIGH PRESSURE UNITS

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ARMY HAS DuBOIS BOOK "PLASTICS" TRANSLATED

The "Infantry Journal," a government publication, is translating the book "Plastics", written by J. H. DuBois, into the German, Austrian, Japanese and Korean languages. These translations will be used as part of the educational program being conducted in the occupied areas.

Mr. J. H. DuBois is Vice-president of the S.P.E. and Eastern Regional Chairman of the National Membership Committee. He is Executive engineer of the Shaw Insulator Company in Irvington, New Jersey.

SPE AND INDUSTRY

(Continued from Page 20)

It is not so (with rare exceptions) among the sciences. It takes training to make a mechanical engineer, an expert chemist or a doctor who removes an appendix as calmly as he winds his watch.

"Book Learnin'" Desirable But Not Necessary

This training or a large part of it, begins in colleges and universities. The sciences need that. The plastics engineers can go forward if all the academic halls of the world are closed to them. College or University training helps, but the equivalent in practical training and intelligence together with the human urge in the pursuit of knowledge of Plastics, is all that is required.

Unfortunately, most such determination involve considerable work evaluating the knowledge to be gained by study and work on the basis of percentage of increase in salary and trusting that the increase means something for the particular service to be rendered.

The useful purpose to which a fund of knowledge of plastics can be applied in producing an abundance of the things which are needed for the welfare, amusement and comfort of our people of the United States can result in many advantages to Plastics Engineers, industry in general who use plastics, and the ultimate consumer who uses the manufactured product.

The S.P.E. offers innumerable opportunities. The ability and determination of an individual to take advantage of them is the true measure of the value of its membership.

S.P.E. membership offers the opportunity to meet and associate with leading plastics engi-

(Continued on Page 26)

N. W. PENNSYLVANIA

(Continued from Page 4)

cellulose acetate and most of the common thermo plastics. This was done in connection with the wall tile program of Presque Isle Plastics. We are proud to have in this section a group which was succesfully able to undertake a development of this kind which ordinarily is limited to the large laboratories of the molding material suppliers.

The following names were announced as director candidates for the 1948 director group: William Byrd, William Phillips, Max English, Jerry Stokes, Al Loranger, Charles Kufner; the national directors Paul Roche and George Laurenson.

Paul Roche spoke on the national annual conference in Detroit January 21 to 23.

LOVELY TO LOOK AT!

Exquisite Beauty for Name Plates, Dials, Trade Marks, Signs and Other Insignia

GITS CRYSTAL SEAL and MULTIPLE SHOT

CRYSTAL SEAL

— a patented Gits Process — is the three dimensional design embedded in transparent plastic, admirably suited for medallions, stationery and desk products, game pieces, knobs, etc. Qualified molders are being licensed and instructed under Patent No. 2,354,857.

Infringers will be vigorously prosecuted. Write for names of licensees.

MULTIPLE SHOT

— a patented Gits Process — consists of two or more separate plastics individually but integrally inter-molded in order to give either a raised or an inlaid effect, admirably suited for counter wheels, business machine keys, etc. Qualified molders are being licensed and instructed under Patents Nos. 2,285,963 — 2,288,187 — 2,298,364 and 2,298,365.

GITS Molding Corporation

4600 WEST HURON STREET, CHICAGO 44, ILL.

PRESENT TRENDS IN THE MOLDING OF THERMOSETTING PLASTICS

By HENRY M. RICHARDSON
DeBell & Richardson, Inc.
Springfield, Mass.

It appears to be generally recognized that a revolution is in progress in the methods of molding thermosetting plastics which is likely to make a fundamental change in the character of this business. The cause of this revolution is the common availability of high frequency dielectric preheating for thermosetting molding compounds plus the general adoption of high speed methods of transfer molding. High frequency electronic preheating was a direct result of the expansion of the electronics industry during the war, making power oscillators available in quantity at relatively low cost. The method of transfer molding is well known to molders and its use in combination with electronic preheating has made it into a high speed production method in addition to its specialty uses.

For a number of years before this revolution started, thermosetting plastics were compression-molded or transfer-molded on relatively slow cycles. The time for curing the compound was generally from one minute for very small pieces up to five or even ten or fifteen minutes for parts with heavy sections. A considerable amount of skill was required of the press operator in order to bring about suitable quality and uniformity of the molded parts and prevent the usual causes of spoilage and rejection. These were: parts which were heavy or unfilled from an excess or deficiency of material; or were warped or blistered from insufficient or nonuniform cure and from trapped volatile matter.

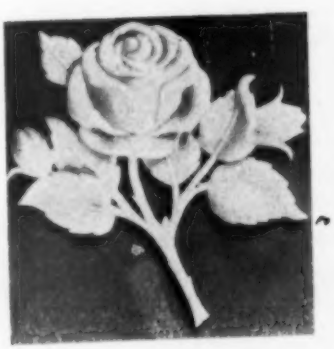
Conduction methods of preheating were used whereby the charge was warmed up by placing on a steam plate, under infra-red lamps, in an oven or in a rotating preheater. In these cases, the material could not be heated up to a point where it was completely plastic before placing in the mold because of the danger of precuring and setting up the compound before molding. Finishing operations were often costly, particularly with high-impact-resistant materials, from the necessity of removing a tough and fibrous flash.

Nevertheless, even with these drawbacks, the molding industry experienced lively competition and produced much excellent work.

During the present transition period, as the result of improved methods of preheating by high frequency or by the use of dry steam as a heat transfer medium, the compound can be brought up to a plastic state before it is placed in the mold so that it may be immediately flowed into place and cured rapidly. By this means, the problem of heat transfer into the compound has been overcome and most of the heating, up to the curing temperature, has been done before the compound is placed in the mold. The net effect of this is to minimize the necessary cure time and make it almost independent of the thickness of the molded piece. This is particularly true where transfer molding is used and the mold is closed before the compound is forced into the cavities through a series of runners and gates. By this system, the compound is heated up to the temperature of the mold as it flows into it and opportunity is afforded for the release of volatile matter as the compound emerges from the gate into the mold cavity. This volatile matter is vented through suitable apertures and does not

(Continued on Page 26)

Process Mold & Mfg. Co.
6455 East Lafayette Avenue
DETROIT 7, MICHIGAN
LOrain 7-6710



See You At Booth No. 1

Jan. 21 - 23, 1948

Roses and Beryllium Copper Go Together

The above cut is a picture of the roses to be found on the beautiful Max Factor Make-up Case. This is just one CASE of the great versatility of Beryllium Copper Cavities or Cores. Send your inquiries to us today.

RALPH CHAPMAN, *President*
JOHN KOONS, *General Manager*

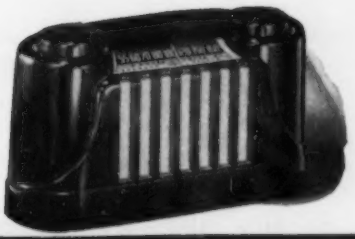
DUREZ phenolic plastics have a spread of properties that make them ideal for unlimited industrial and resale products. Some are shown in these six highly successful applications. Each of them is unrelated to the others in the combination of mechanical, electrical, and chemical values the manufacturer required. One or more of these materials may well match *your* needs today.

Our continuing plant expansion, perfected quality controls, and enlarged testing facilities are reflected in the increasing use of Durez for improved, redesigned, or all-new products. If you want to know what other manufacturers are accomplishing with Durez, let us send you *Durez Plastics News* each month without charge.

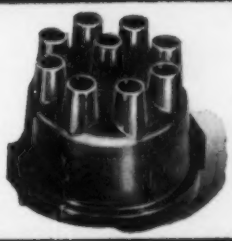
Durez Plastics & Chemicals, Inc., 50 Walck Road, North Tonawanda, N. Y.

6 WAYS TO COMPLETE THE STATEMENT—

"Our products need . . ."

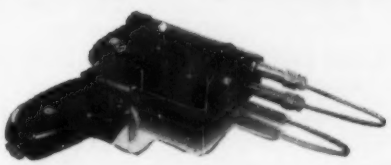


LOW-COST PRODUCTION

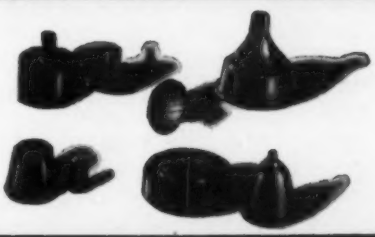


ELECTRICAL STRENGTH

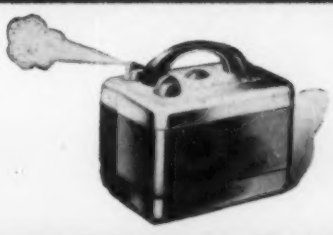
IMPACT STRENGTH



HEAT RESISTANCE



CHEMICAL RESISTANCE



SPECIAL PROPERTIES

LOW-COST PRODUCTION Excellent moldability is a cost-reducing characteristic of all Durez compounds. Here a general-purpose compound with every requisite . . . light weight, self-insulation, and attractive surface lustre . . . is used for a one-piece radio housing.

ELECTRICAL STRENGTH Automotive distributor caps are among the many applications requiring the high electrical resistance of this Durez group.

IMPACT STRENGTH In heavy-duty industrial applications such as telephones, camera cases, and machine parts, Durez combines mechanical strength with excellent wear resistance.

HEAT RESISTANCE Use of Durez for welding-gun housings demonstrates the efficacy of the heat-resistant phenolic compounds.

CHEMICAL RESISTANCE High resistance to alcohol, solvents, and many other chemicals makes certain types of Durez best for closures and other packaging applications.

SPECIAL PROPERTIES Success in rayon processing equipment parts, acid pump impellers, automotive water pumps, and marine pump housings suggests consideration of Durez wherever special properties are needed.

DUREZ

PHENOLIC RESINS

- MOLDING COMPOUNDS
- INDUSTRIAL RESINS
- PROTECTIVE COATING RESINS

Durez will be represented at the Society of Plastic Engineers Conference at Booth 32, Rackham Memorial.

PRESENT TRENDS

(Continued from Page 24)

remain to cause blistering and retard the cure of the pieces.

By this combination also, most of the operator's skill in thermosetting plastic molding is eliminated. The mold is already closed, the compound is soft and plastic, and it is not necessary to "breathe" the mold to release trapped volatile matter. Thus, the press operator, once having started the molding cycle, is free to devote his entire attention to the operation of another press or to degating and finishing operations until the press is ready to open. By reducing the cure time, it has been possible to increase the output per cavity of molds by 100% to 300%. This means a very much higher output per mold or per press per day and results in an appreciable cost reduction. Furthermore, in the finishing of molded parts, a uniformly thin or nonexistent flash goes along with uniformity of dimensions, good appearance, and reduced finishing costs.

Most of the advantages of these new methods have been gained, up to now, by the use of existing hydraulic press equipment. This equipment was considered satisfactory and competitive for compression molding prior to the war, but now that curing time of the compound is so much less, the principal opportunity for further reduction of molding cycles lies in speeding up the operation of the press so that still higher output can be obtained and lower costs and better deliveries extended to the users. Also, in order to make most efficient use of the operator's time, a more general adoption of automatic cycle control is indicated.

With automatic controls and with suitable high speed equipment available; with methods which have removed most of the individual skill from the molding operation, there has been a trend toward more installation of equipment in the production lines of those manufacturers who use plastics and who previously purchased their plastic parts from the custom molders. In order to compete with this trend, it is necessary that the custom molder have equipment and methods which are available to the manufacturer who wants to supply his own plastic parts.

There are still ample opportunities for the exercise of skill and enterprise on the part of the plastic molders. Their background of experience and knowledge find expression in the proper and economical design of molded parts which not only perform their required functions but which are also economical to mold. The careful design of molds for maximum output, minimum liability for maintenance, the use of automatic fixtures for core pulling, insert setting, gate trimming, etc., and the choice and application of the right materials, suitable heating, and skillful mold-making results in continuous twenty-four-hour-a-day production without interruption and with uniform parts of the desired quality. In this field, the custom molder should find ample opportunity to render a service and make a profit.

RESOLUTION

(Continued from Page 2)

during the past years, that we express our hearty appreciation; and

To all others who have contributed in so many ways to our enjoyment of the 5th Annual Meeting.

Respectfully submitted to
Detroit Section Board of Directors
Resolutions Committee,
Karl Kithil, Chairman.

This Resolution is unanimously approved by Detroit Section Officers and Board of Directors.

T. Walter Noble, President
K. W. Kithil, Vice-President
J. S. Miller, Secretary
P. F. Robb, Treasurer
Dr. C. W. Selheimer — W. R. Walsh
R. C. Dailey — R. C. Bedell
A. D'Agostino

SPE AND INDUSTRY

(Continued from Page 23)

neers, many of whom have spent a lifetime in plastics, to discuss with them the problems of today; to contribute to and become a part of an organization whose standardization and research programs are vital to industrial engineering progress.

Through its meetings, the S.P.E. offers opportunities to hear the men who know, discuss results of latest advances in plastics, new product design and all other types of progressive movements in plastics. Members are free to participate, to ask questions.

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WINNERS OF SPE CONTEST ANNOUNCED — NEW DIRECTORS ELECTED

By J. C. CASSIDY, Jr.

Local awards of the First National Prize Paper Contest sponsored by The Society of Plastics Engineers, Inc., were made at a dinner meeting of the Buffalo Section held on Friday evening, December 19, at the Hotel Westbrook in Buffalo. First prize of $250 was awarded to Minert E. Hull for his paper, "The Technology of Phenolic Resins in Rubber." Mr. Hull is a research chemist employed by Durez Plastics & Chemicals, Inc., of North Tonawanda. His paper has been entered jointly by the Buffalo and Rochester Sections in the National Contest, the results of which will be announced in January.

Left to Right: P. Rodney Sultzbaugh, Jr., Minert E. Hull, and Herbert Boge, Prize Paper winners.

P. Rodney Sultzbach, Jr., of Stromberg-Carlson Company, Rochester, won the $100 second prize with his paper entitled, "Plastics and the X-Y System." A paper on "Dichlorostyrene, A New Laminating Resin," written by Herbert Boge of Mathieson Alkali Works, Inc., of Niagara Falls, was awarded the third prize of $50. The three winning papers were presented by their authors after the awards had been made. All other entrants in the contest were also present at the meeting as guests of SPE.

The judging of the contest, which was designed to stimulate constructive and original thinking on plastics among young technicians and students under 30 years of age, was undertaken by a committee headed by Dr. George J. Goepfert of the Carborundum Company. Other members of this committee were John E. Miner of Spaulding Fibre Company, J. Clarke Cassidy, Jr., of Durez Plastics & Chemicals, Inc., Henry J. Kauth of Kauth-Hardy Company, and Harry V. Steele, of Auburn Button Works, Inc.

(Continued on Page 30)

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PLASTICS FROM PETROLEUM

Contribution from
SOCONY-VACUUM LABORATORIES
(A Division of Socony-Vacuum Oil Company, Inc.)
Research and Development Department
Paulsboro, N. J.

By R. B. BISHOP

The number of chemicals derived from petroleum is legion, and many of these can be used in the plastics industry by simple chemical manipulation, this discussion will be limited to some of the newer, less publicized petroleum chemicals. The complete disregard of such staid, proven petroleum chemicals as butadiene, styrene, formaldehyde, etc., should not detract from their improtance or relative merit. It should be emphasized that the chemicals treated in the following talk are the ones with which the speaker is familiar—his own back yard so to speak—and that the research department of each major oil company would have similar developments.

Petroleum consists of a myriad of hydrocarbons, and with the industry continually striving toward improved products, e. g., the tailormade fuels like triptane, a pure hydrocarbon, it is not surprising to find a larger number of purer individual hydrocarbons being made from petroleum each day.

Using the processing techniques and the equipment peculiar to the petroleum industry, a number of chemicals have recently been manufactured which have found their way into the plastics industry. For example, the Hydroforming process converts napthenes, paraffins and olefins into aromatic hydrocarbons from which a benzene fraction and a xylene fraction are going directly into the plastics market.

Likewise a large volume of the high boiling aromatic cuts obtained from catalytic cracking of petroleum are now used to plasticize the vinyl resins, especially where a slight yellow color is not objectionable.

Phenol, one of the oldest plastic intermediates, may be produced from petroleum benzene in three ways. The first method involves sulfonation followed by caustic treatment and neutralization. The second is the chlorination-hydrolysis process or its modifications. In this process the basic reactions are the monochlorination of benzene followed by caustic hydrolysis of the chlorobenzene to sodium phenolate, which is then neutralized to a pH of 6-7 to yield phenol. The September issue of Chemical Engineering carries a flow diagram of this process. A third method recently disclosed by U. S. Patent 2,415,101 produces phenol by the air oxidation of impure benzene.

Phenol and cresols are also produced from petroleum crudes by extraction. Certain crudes contain oxygenated products of which a large proportion are phenol and cresylic acids. These may be recovered by the method of Holzman and Pilat which consists of extracting the crude steam distillation product with a 6 per cent caustic followed by a stronger caustic treat and purification with ether extraction. Although the purity of the acids produced by such extractions does not approach that of phenol prepared synthetically, large volumes of these petroleum products are being used by the plastic industry.

Another aromatic petroleum fraction from the hydroforming process contains 20 per cent o-xylene. This o-xylene is now being commercially separated and oxidized to phthalic anhydride. In this process the o-xylene and air, in excess, are passed over a vanadium oxide catalyst at 1000°F with contact times of less than 1 second. Yields in excess of 70% and a product purity of 99.7% are reported. This is the first time that phthalic anhydride has been made commercially from sources other than coal tar. This petroleum plant is now producing 5% of the total anhydride consumed and the plant capacity will shortly be doubled.

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(Continued on Page 30)

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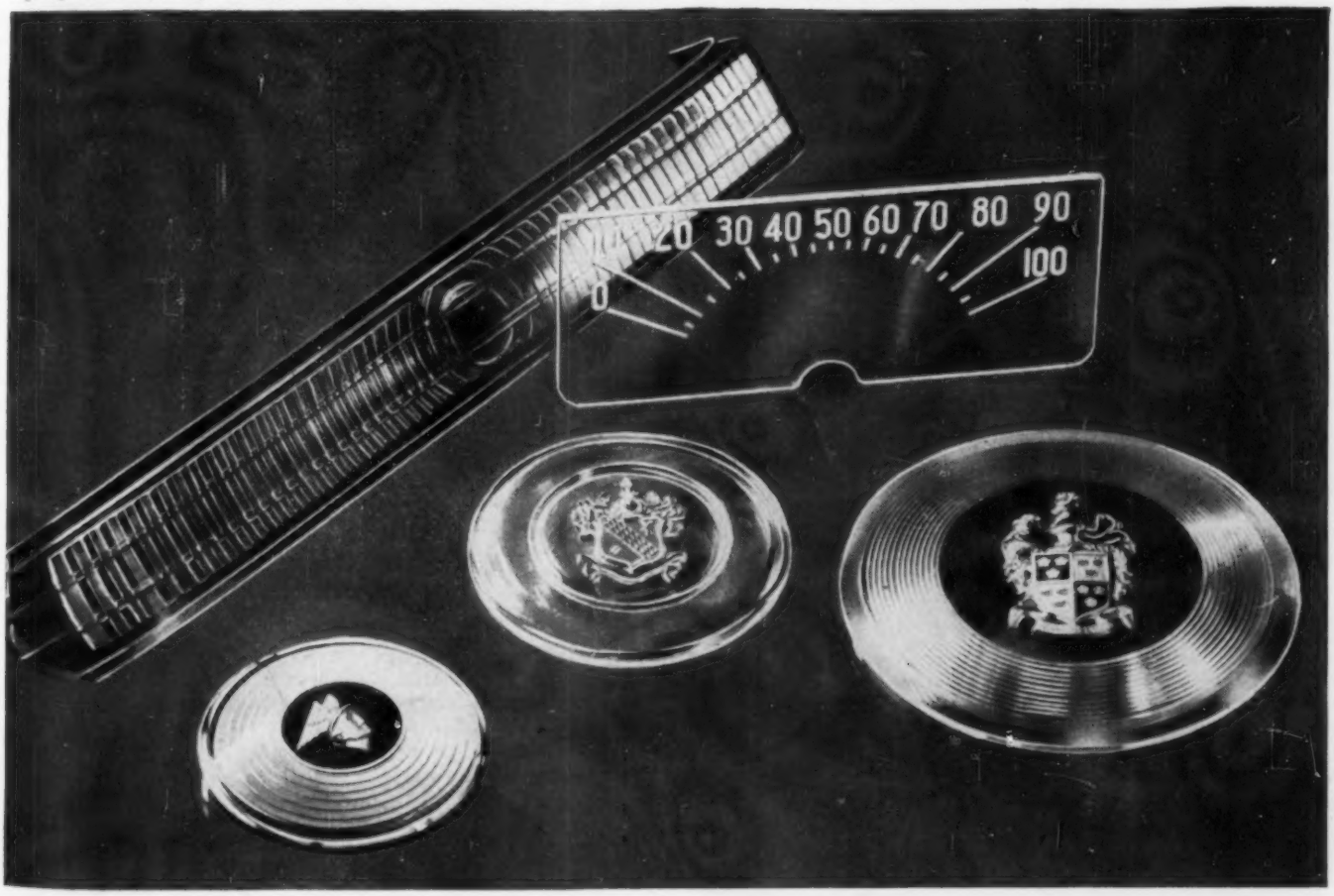

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PLASTICS FROM PETROLEUM

(Continued from Page 28)

lene, by pyrolytic cracking of petroleum oils has been greatly improved. The chemical activity of the unsaturates has been long established, and a whole host of the ethanoid resins may be prepared from these raw materials. The allyl chlorides and alcohols may be prepared by chlorination and hydrolysis of propylene which may also be produced by pyrolysis. One large chemical company finds these unsaturated gases in such demand for the production of plastic raw materials that they are installing a petroleum cracking unit to help them keep pace with the expanding markets of the vinyl type resins.

Two new chemical families obtained from petroleum are the nitriles and thiophenes. The production of aliphatic nitriles from ammonia and olefins over a catalyst has been investigated by a number of oil companies. Just recently the literatures carried the announcement of the availability of an aromatic nitrile, specifically benzonitrile, produced from toluene and ammonia. In Germany benzonitrile has been reacted with dicyandiamide to form benzoguanadine, a melamine type resin, which is reported to give better gloss and heat stability than the conventional melamines. In addition, benzonitrile is an extremely effecitve solvent for certain vinyl resins.

Thiophenes, the other family mentioned above, are beginning to enter the plastics field. An article entitled "Resins from Thiophene", will soon appear in Industrial and Engineering Chemistry.

This will disclose that thiophene reacts with formaldehyde under acidic conditions but unlike phenol will not react at alkaline pH. The primary products of this condensation are viscous liquids and plastic solids which can be thermoset by further heat treatment. These materials have also been cast. Thiophene mixed with phenol in as high as 60% concentration will likewise set up under these conditions. The physical properties of these resins compare favorably with some phenolics. Additional research and development is necessary to obtain a more uniform product. The thiophene used in making these resins was obtained from a petroleum gas, butane, by reacting it with sulfur at short contact times and temperatures of between 1000-1400°F.

Since large volumes of hydrogen fluoride are used by the petroleum industry and since its handling techniques have been developed by this industry the application of this catalyst as a condensation agent in the formation of aldehyde resin is to be expected. U. S. Patent 2,397,398 discloses the use of hydrogen fluoride as a catalyst in producing resins from aromatic-rich petroleum fractions and formaldehyde. Completely polymerized resins can be used as paint extenders, while less highly polymerized materials make excellent plasticizers for other resins. U. S. Patent 2,406,339 describes the use of the same catalyst to produce improved colors and reaction times in the standard phenol-formaldehyde resins.

Petroleum products also find their way into the plastics industry in many other ways such as solvents, extenders and thinners. The ratio of the volume of petroleum products used by the resin industry to the total volume of petroleum products is now relatively small, but it is steadily increasing. These are but a few of the chemicals produced from petroleum and there are undoubtedly many more that could be mentioned.

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WINNERS

(Conitnued from Page 27)

Area industries which contributed to the award fund were: Hy-Therm Plastic Molding Corp., Molds and Manufacturing Co., and Lake Erie Engineering Corp. of Buffalo; Norton Laboratories, Inc., of Lockport; Durez Plastics & Chemicals, Inc., and The Rudolph Wurlitzer Co. of North Tonawanda; Spaulding Fibre Co., Inc., and Roe Tool & Die Co. of Tonawanda; The Carborundum Co. and Varcum Chemical Corp. of Niagara Falls, New York; Auburn Button Works, Inc., of Auburn; the local sales offices of Durite Plastics, Inc., of Philadelphia, Pennsylvania; National Vulcanized Fibre Co. of Wilmington, Delaware; and Michigan Molded Plastics, Inc. of Dexter, Michigan.

(Continued on Page 31)

WINNERS

(Continued from Page 30)

Also announced at Friday's meeting were the names of the newly-elected directors of the Buffalo Section. These were: A. N. DiAddario of Molds and Manufacturing Company, Earl A. Russell of Spaulding Fibre, Richard R. Van Geem of Trimold, Inc., and J. Clarke Cassidy, Jr., of Durez Plastics.

MOLD PRESSURES

(Continued from Page 1)

of the molded part can be expected. The part will actually be larger than the mold cavity in which it has been molded.

It is almost impossible to set up definite methods for calculating the required transfer molding pressures because of the many variables in the methods of transfer molding, molding equipment, mold design, molded part design, as well as the variables previously mentioned.

The "pot type" transfer molding requires higher transfer pressures than the various

Fig. illustrates a pot type mold and the method of calculating the pressures and molding area.

PA=Pot area
PR=Pressure psi on pot
C=Press pressure
MA=Molding area including runners.

$PA \times PR = C$
$MA + 10\% = PA$
$PA - 10\% = MA$
$\frac{C}{PA} = PR$

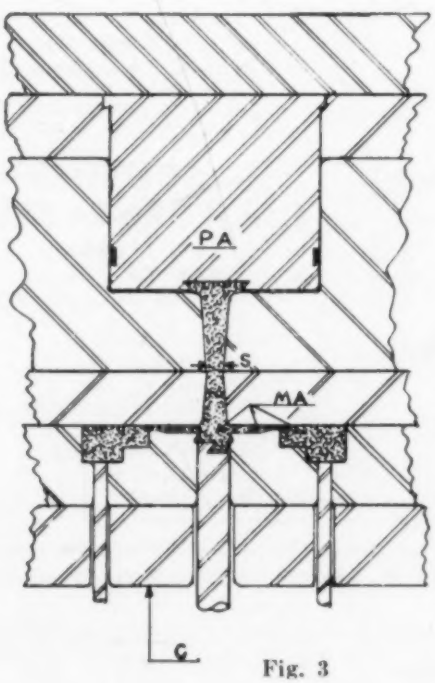

Fig. 3

auxiliary ram methods because of greater distance of flow required through the sprue. Generally for a 1½" average length sprue a 50% higher pressure is required.

Generally for soft general-purpose material, we recommend 8000 psi for auxiliary ram type transfer molding and 12,000 psi for the pot type transfer molding. These pressures are based on high-frequency preheating and a total runner area of .05 sq. in. Gate area depends on the number of cavities. Individual gate size can be as small as .010" deep and ⅛" wide. However, the total gate area should be at least 30% of the runner area. The runners and sprues should be as short as possible.

For oven preheating approximately 100% greater presusre should be used. For a larger quantity of material the runner and gate area should be enlarged frof 50% to 100%, and even then the transfer time will be extended beyond the high-frequency preheating.

Curve chart Fig. 1 illustrates the transfer results obtained on 100 grams of material under the various pressures and methods of preheating, using ⅛" and ¼" diameter orifice. For example, Test A—material in "as received" condition using the ¼" diameter orifice required 16 seconds to transfer 100 grams of material at 50,000 psi and 100 seconds at 14,000 spi. Test B—over preheated preforms at 230° F. for 15 minutes using the same sized orifice required 8 seconds at 30,000 psi and 36 seconds at 10,000 spi. Test G—high-frequency preheated preforms to the temperature of 270° F. required 3 seconds at 10,000 psi and 6 seconds at 4000 psi to transfer the 100 grams.

Curve chart, Fig. 2, illustrates the time and amount of material transferred under 4000 and 8000 psi through ¼" diameter orifice using high-frequency preheated preforms. For example, Test B at 8000 psi required 10 seconds to transfer 400 grams of material and Test A at 4000 psi required 22 seconds. The lower pressure extends

(Continued Inside Back Cover)

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MOLD PRESSURES (from Page 31)

the transfer time, causing polymerization and consequently resulting in difficulties with unfilled pieces, particularly when the flow of the material is diverted by obstructions such as core pins, inserts, or air pockets.

Air vents are of the utmost importance. A transfer mold operating at 18,000 psi was causing difficulties with unfilled pieces on the corners and protruding bosses. After properly air venting each cavity, aproximately .004" deep and 3/16" wide, it was possible to operate the same mold at 10,000 psi. This is particularly true on fast-setting materials such as mica-filled.

Clamping Pressure

Theoretically there is no internal hydrostatic pressure in the cavity. This theory, however, is based on a precise coordination of polymerization and exact amount of material, i.e., just as the cavity is filled, the material is solidified at the same time. To accomplish both of these actions simultaneously would be impossible unless the very minimum transfer pressures were used. Of course, this would be detrimental to economical production. Hence, at least 10% extra clamping pressure must be provided to prevent the mold from floating and flashing by the hydrostatic action upon completion of transferring the material from the chamber into the cavity. When an accumulator system is used, causing very fast travel at full pressure and resulting in a certain amount of surge, it is advisable to exceed the 10%.

Fig. illustrates an auxiliary ram type transfer mold and the method of calculating pressures and molding area.

AR = Auxiliary ram pressure
PA = Chamber or pot area
CP = Clamping pressure
MA = Molding area including runner and cull
PR = Pressure psi on material chamber

$\frac{AR}{PA} = PR$

$\frac{CP}{PR} - 10\% = MA$

$PA \times PR = AR$

$PR \times MA + 10\% = CP$

$\frac{AR}{PR} = PA$

(See Chart on page 8)

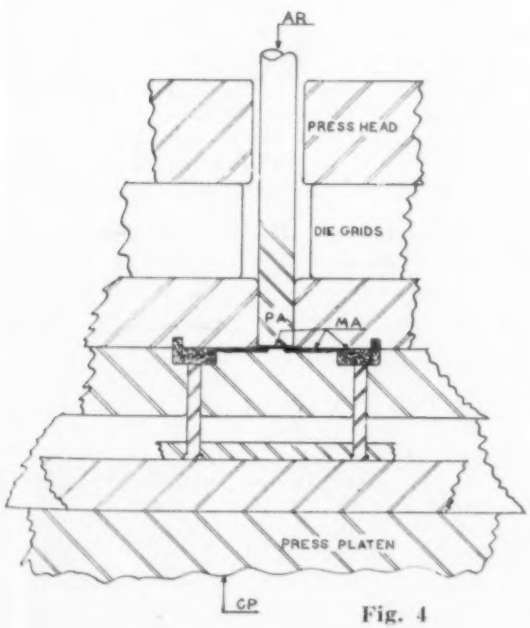

Fig. 4

Transfer vs. Clamping Pressure

The ratio of claming pressure to auxiliary ram pressure has always been a major problem when selecting molding equipment. Hence equipment has been purchased with various ratios which ranged from as low as 3 to 1 to as high as 8 to 1.

A study of a number of present transfer molding jobs as well as many potential jobs revealed a trend toward a ratio of 6 to 1, although the ratio of 5 to 1 followed closely. Since this lower ratio is required at certain times, it would be well to standardize the equipment at the 5 to 1 ratio and simplify the hydraulic equipment. For example, a press with a 3 to 1 auxiliary cylinder ratio requires a larger diameter ram. This press takes a greater quantity of hydraulic fluid for economically fast operation and necessitates the use of a larger volume pump and a larger motor with consequent higher cost.

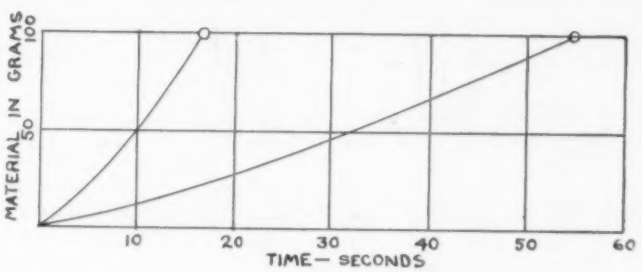

Fig. 5

Assuming that a 300-ton press with a 60-ton auxiliary ram is purchased, a 4⅜" diameter transfer chamber can be used. This will supply 8000 psi. transfer pressure, which is the minimum pressure recommended for high-frequency preheated material. If 4¼" diameter preforms are used, quite a volume of material can be transferred. In most instances, this volume of material is far greater than will be possible to mold with 300 tons of clamping pressure, unless the part is deep with a small projected area.

Curve chart, Fig. 5, illustrates the transfer results on high-impact canvas-filled, high-frequency pre-heated material at 8000 psi through ⅛" and ¼" diameter orifice. It can be noted that 100 grams of material have been transferred through ¼" diameter orifice in 17 seconds and through ⅛" diameter orifice in 55 seconds. This would indicate that the general-purpose material pressures could be used. However, the transfer time has been extended so much that difficulties could be expected in the actual production.

For most economical production 50% greater pressure should be used. Sprues, runners, and gates must be larger than for general-purpose material to preserve the filler and retain the maximum strength.

The minimum individual gate area should be .02 sq. in. and the runner area for approximately 2" length should be .05 sq. in. This will allow the feeding of two gates if necessary.

In pot type transfer molding the small end of the sprue should be at least 50% larger than the runner.

Methods for calculating the molding area and clamping pressures are the same as for general-purpose materials.

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